THE EFFECTS OF DEPLOYMENTS AND OTHER FACTORS ON AIR FORCE JUNIOR OFFICER RETENTION

THESIS

Jarrett L. Weiblen, Captain, USAF

AFIT/LSCM/ENS 12-22

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

The views expressed in this thesis are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the United States Government.

AFIT/LSCM/ENS/12-22

THE EFFECTS OF DEPLOYMENTS AND OTHER FACTORS ON AIR FORCE JUNIOR OFFICER RETENTION

THESIS

Presented to the Faculty

Department of Operational Sciences

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics and Supply Chain Management

Jarrett L. Weiblen

Captain, USAF

March 2012

AFIT/LSCM/ENS/12-22

THE EFFECTS OF DEPLOYMENTS AND OTHER FACTORS ON AIR FORCE JUNIOR OFFICER RETENTION

Jarrett L. Weiblen
Captain, USAF

Approved:

///SIGNED///	15 March 2012
Darryl Ahner, LTC, USA (Chairman)	Date
///SIGNED///	15 March 2012
Sharon Heilmann, Lt Col, USAF (Member)	Date

Abstract

The Air Force is dedicated to supporting the Combatant Commander through the use of Individual Augmentees (IA) to fulfill joint mission requirements. Previous studies have explored how deployments affect retention; however, there has not been a great deal of focus on how IA deployments affect retention for Junior Air Force Officers in the Logistics, Support, Operations, Acquisitions, and Special Investigations career groups. This research utilizes the Individual Deployer (ID) definition to identify IAs through Personnel, Pay and Deployment data provided by the Defense Manpower Data Center (DMDC) from 2003 - 2009. A Logistic Regression was used to determine how deployments effected the odds of retention. Other independent variables consistent with the literature such as Marital Status, Gender, Pay Grade, Commissioning Source, Deployment Type, and Career Group were observed to determine how they affect the odds of retention for Air Force Junior Officers. Survey responses from the above sample were drawn from Status of Forces surveys spanning fiscal years 2003 to 2009; mean responses are analyzed and compared and contrasted with the findings from the logistic regression models.

This research develops analytical models for decision makers that identify factors that effect retention. This research determined that the odds of retention increase for Males, personnel that are married, and personnel that are in the Logistics Career Group when compared to Support, Acquisitions, Operations, and Special Investigations Career Groups. The odds of retention decreased for personnel in the Support Career Group when compared to Logistics, Acquisitions, Operations, and Special Investigations Career Groups, and for personnel who commission through ROTC.

To my amazing wife and son, none of this would have been possible without you. Thank you Lord for all the blessings in our lives.

Acknowledgments

I would like to express my sincere appreciation to my faculty advisor, LTC Darryl Ahner, for his guidance and support throughout the course of this thesis effort. The insight and experience was greatly appreciated. I would, also, like to thank Lt Col Heilmann for her feedback and inputs. Finally I would like to thank Carl Parson, for his advice, and all of the data he provided.

Jarrett L. Weiblen

Table of Contents

Page

Abstract iv

Acknowledgments vi

Table of Contents vii

List of Figures xi

List of Tables xii

I. Introduction 1

Statement of Problem 1
Scope of Research 2
Issues, Needs, Limitations 2
Summary 3

II. Literature Review 4

Chapter Overview 4
Individual Augmentee Definition 4
Junior Officer Definition 5
Individual Deployers and Deployment Types 5
How do Deployments Effect Retention? 6
Individual versus Unit Deployments 7
Deployers versus Non Deployers 9
Other Variables that may Effect the Odds of Retention 11
Pay Grade 11
Marital Status 12
Gender 15
Career Groups 15
Commissioning Source 16
Survey Analysis 17
Chapter Summary 19

III. Methodology 20

Chapter Overview 20
Human Subjects Information 20
Data 20
Data Limitations 23
Experimental Design Logistic Regression 24

Model Discussion....26
Deployment Type....*33*
Career Groups....*33*
Gender....*34*
Marital Status....*34*
Pay Grade/Rank....*35*
Commissioning Source....*35*
Limitations and Assumptions....35
Statistical Analysis Logistic Regression....37
Logistic Regression Assumptions....*39*
Goodness of Fit....*41*
Logistic Regression Limitations....*45*
Experimental Design Survey Data....45
Statistical Analysis t-test....46
t-test Assumptions....*47*
Type I, Type II Errors....48
Survey Questions and Scales....48
Statistical Software....50
Research Questions and Hypothesis....51
Logistic regression model Research Questions:....51
Deployment Type....*51*
Career Group....*51*
Male Deployers....*51*
Female Deployers....*52*
Married Deployers....*52*
Males and Marital Status....*52*
Females and Marital Status....*53*
Survey Analysis Research Questions:....53
Deployment type:....*53*
Career Group....*54*
Gender....*55*
Marital Status....*55*
Commissioning Source....*56*
Pay Grade....*57*
Chapter Summary....58

IV. Analysis and Results....59

Chapter Overview....59
Research Question 1: Deployment Type....59
Results for Research Question 1....*61*
Research Question 2: Career Groups....61
Operations....*62*
Support....*65*
Logistics....*67*

Acquisitions *70*
Special Investigations *72*
Results for Research Question 2 ..... *74*
Parsimonious model 77
Results for Parsimonious Model *79*
Interaction Variables 81
Research Question 3: Male Deployers 81
Results for Research Question 3 ..... *83*
Research Question 4: Female Deployers 84
Results Research Question 4 ..... *86*
Research Question 5: Married Deployers 87
Results Research Question 5 ..... *89*
Research Question 6: Males and Marital Status 90
Results Research Question 6 ..... *92*
Research Question 7: Females and Marital Status 93
Results Research Question 7 ..... *95*
Analysis of Survey Results 96
Procedures for survey analysis *96*
Deployment type 98
Individual Deployers *98*
Unit Deployers *100*
Both Deployers *102*
Career Group 103
Operations *103*
Logistics *104*
Support *106*
Gender *107*
Marital Status 108
Married *109*
Not Married *110*
Commissioning Source 111
Air Force Academy *111*
ROTC *113*
OTS, ANGA, Other *115*
Pay Grade 117
Captain *117*
1st Lieutenants *118*
Chapter Summary 120

V. Conclusions and Recommendations 122

Chapter Overview 122
Restatement of the Problem 122
Limitations 122
Review of Literature 124

Review of Methodology....124
Restatement of Results....125
Recommendations....129
Recommendations for Future Research....130
Chapter Summary....131

Appendix A. Human Subject Exemption Approval....132

Appendix B. Logistics Regression Tables of Results....134

Appendix C. Survey Analysis Tables of Results....139

Appendix D. Story Board....148

Bibliography....149

Vita....152

List of Figures

Page

Figure 1: Effects of Deployments on Retention Model 29

Figure 2: Effects of Other Variables of Interest on Retention Model 30

Figure 3: Effects of Deployments on Retention Model 60

Figure 4: Operations Retention Model 62

Figure 5: Support Retention Model 65

Figure 6: Logistics Retention Model 67

Figure 7: Acquisitions Retention Model 70

Figure 8: Special Investigations Retention Model 72

Figure 9: Parsimonious Retention Model 77

Figure 10: Male Deployer Retention Model 81

Figure 11: Female Deployer Retention Model 84

Figure 12: Married Deployers Retention Model 87

Figure 13: Male Marital Status Retention Model 90

Figure 14: Female Marital Status Retention Model 93

List of Tables

Page

Table 6: Deployment Type Sample Sizes 22

Table 7: Survey Sample Sizes 23

Table 8: Sample Sizes for Independent Variables 26

Table 1: Deployment Model Variable Coding 29

Table 2: Marital Status Variable 31

Table 3: Deployment Type Variable 32

Table 4: Pay Grade Variable 32

Table 5: Commissioning Source Variable 32

Table 9: Linear Relationship of Independent Variable 41

Table 10: Survey Response Comparisons 50

Table 11: Model 1 Chi-Square Summary 60

Table 12: Operations Chi-Square Summary 62

Table 13: Operations Hosmer and Lemeshow Summary 63

Table 14: Summary of Results: Operations 64

Table 15: Support Chi-Square Summary 65

Table 16: Support Hosmer and Lemeshow Summary 66

Table 17: Summary of Results: Support 66

Table 18: Logistics Chi-Square Summary 68

Table 19: Logistics Hosmer and Lemeshow Summary 68

Table 20: Summary of Results: Logistics 69

Table 21: Acquisitions Chi-Square Summary 70

Table 22: Logistics Hosmer and Lemeshow Summary 71

Table 23: Summary of Results: Acquisitions 71

Table 24: Special Investigations Chi-Square Summary 73

Table 25: Special Investigations Hosmer and Lemeshow Summary 73

Table 26: Summary of Results: Special Investigations 74

Table 27: Parsimonious Model Chi-Square Summary 78

Table 28: Parsimonious Model Hosmer and Lemeshow Summary 78

Table 29: Summary of Results: Parsimonious Model 79

Table 30: Male Deployers Model Chi-Square Summary 82

Table 31: Male Deployers Model Hosmer and Lemeshow Summary 82

Table 32: Summary of Results: Male Deployers Model 83

Table 33: Female Deployers Model Chi-Square Summary 85

Table 34: Female Deployers Model Hosmer and Lemeshow Summary 85

Table 35: Summary of Results: Female Deployers Model 86

Table 36: Married Deployers Model Chi-Square Summary 88

Table 37: Married Deployers Model Hosmer and Lemeshow Summary 88

Table 38: Summary of Results: Married Deployers Model 89

Table 39: Males Marital Status Model Chi-Square Summary 91

Table 40: Males Marital Status Model Hosmer and Lemeshow Summary 91

Table 41: Summary of Results: Males Marital Status Model 92

Table 42: Females Marital Status Model Chi-Square Summary 94

Table 43: Females Marital Status Model Hosmer and Lemeshow Summary 94

Table 44: Summary of Results: Female Marital Status Model 95

Table 45: Summary of Survey Results: Individual Deployers 100

Table 46: Summary of Survey Results: Unit Deployers 101

Table 47: Summary of Survey Results: Both Deployers 102

Table 48: Summary of Survey Results: Operations 104

Table 49: Summary of Survey Results: Logistics 105

Table 50: Summary of Survey Results: Support 107

Table 51: Summary of Survey Results: Gender 108

Table 52: Summary of Survey Results: Married 110

Table 53: Summary of Survey Results: Not Married 111

Table 54: Summary of Survey Results: Air Force Academy 113

Table 55: Summary of Survey Results: ROTC 114

Table 56: Summary of Survey Results: OTS, ANGA, Other 116

Table 57: Summary of Survey Results: Captain 118

Table 50: Summary of Survey Results: 1st Lieutenant 119

THE EFFECTS OF DEPLOYMENTS AND OTHER FACTORS
ON AIR FORCE JUNIOR OFFICER RETENTION

I. Introduction

Statement of Problem

The Air Force is dedicated to supporting the Combatant Commander through the use of Individual Augmentees (IA) to fulfill joint mission requirements. The Air Force Vision Statement stresses the importance of supporting the Combatant Commander: "The United States Air Force will be a trusted and reliable joint partner with our sister services known for integrity in all of our activities, including supporting the joint mission first and foremost." (Air Force Personnel Center, 2011) IAs are temporary duty positions in which a member leaves their unit to augment positions during contingency operations. The Air Force has deployed a large number of personnel in support of the Combatant Commander and invests a significant amount of money into training and developing officers with skill sets that are vital to both the Air Force and Joint mission. "By 2008, joint sourcing solution positions filled by Air Force personnel accounted for almost 25 percent of the 25,000 airmen located in the USCENTCOM area of operations." (Ausink, Cook, Firoz, Drew, Lichter: 2011, xi) It is vital that the Air Force retain trained personnel who develop critical experience while deployed in support of both the Air Force and Joint Mission. Due to the large number of deployments many service members with vital skill such as Security Forces and Logistics Readiness Officers, "are experiencing deployment strains well beyond what would be expected under the planned Air Expeditionary Force (AEF) construct" (Ausink, et al: 2011, xi), which may have adverse implications on service member retention. The Air Force Personnel Center

(AFPC) demographics website identifies stressed Air Force Specialty Type Codes which include such professions as Civil Engineering, Acquisitions, and Public Affairs. Air Force personnel perform jobs and acquire unique skills while deployed under Joint Taskings which are invaluable to the Air Force's ability to function within the joint environment. Retention of these capabilities is vital to the health of our service and it is important to determine what effects deployments have on the retention of Air Force Junior Officers.

Scope of Research

The purpose of this study is to determine, through collected data, what factors effect retention and then compare and contrast these results with the limited surveys completed by the overall population considered. The factors that are explored are deployment type, pay grade, gender, career group, marital status, and commissioning source. The results of the logistic regression analysis will drive the survey data analysis in an effort to compare and contrast actions captured by the regression models with perceptions represented by the survey data.

Issues, Needs, Limitations

It is vital to state that while this study may reveal relationships and correlations between retention and independent variables, it does not provide exact causality. Involuntary and voluntary turnover are not identified due to data limitations. This model also does not address self-selection or deployment volunteers versus personnel who are involuntarily tasked to deploy. Another limitation of this research is that IAs are not identified in the DMDC data. Individual Deployers are instead identified to represent IAs

and are defined as “a Service member deployed from their assigned Unit Identification Code (UIC) where less than five (5) percent of the Service members assigned to that UIC are deployed within a given month.” (Ahner, Heilmann, Parson, 2011: 4) The DMDC data analyzed in this study contained various erroneous dates (identified as null values) and records which are not included in the analysis which limited the overall sample size. Further limitations include the inability to identify personnel that were separated from service due to Force Shaping initiatives which occurred throughout the observed time frame. A stop loss also occurred four months in 2003, which is not accounted for; assumptions are made to address these issues. Additional assumptions are discussed further in the methodology section of this thesis. Finally, external factors such as current economic conditions are not observed for this study.

Summary

This chapter outlines the Air Force’s commitment to supporting the joint mission through the use of IAs as well as the importance of retaining experienced personnel. Due to limitations in the data the, Individual Deployer definition is discussed and the scope of this research is explored. Issues, needs, and limitations are summarized. The next chapter will explore literature regarding this research.

II. Literature Review

Chapter Overview

This chapter provides an overview of the IA process as well as previous studies dealing with retention. First, IAs are defined followed by a brief description of how IAs are sourced. Junior Officers are then briefly defined. Next the Individual Deployer definition is discussed, different deployment types are defined and data limitations are presented. Previous retention studies are then addressed to highlight previous findings as to how deployments effect retention and reenlistment. Furthermore the literature is explored to discuss other variables of interest and how they effect retention. Behavioral theory is briefly reviewed followed by a description of Survey analysis.

Individual Augmentee Definition

An IA is defined as "an unfunded temporary duty position (or member filling an unfunded temporary duty position) identified on a Joint Manning Document (JMD) by a supported Combatant Commander to augment staff operations during contingencies." (CJCSI 1301.01C, 2004: 2) This enables the joint task force commander or combatant commander to augment units and existing organizations with temporary personnel ensuring the success of joint missions. It is the commander's responsibility to identify the needed positions. Once the position requirement is validated, it is forwarded via the Joint Manning document where each service is identified for filling the needed positions.

Upon receiving the request, the service reviews it and is responsible for formulating a formal response outlining any issues with the request. For the Air Force,

once the issues are resolved the tasking is formalized and submitted to the Air Expeditionary Force Center (AEFC) which is responsible for filling the positions. "The AEFC will develop procedures to ensure validated positions assigned to the Air Force for which a sourcing solution has not been identified are (1) examined for ability to source and sustain, and (2) filled at the earliest opportunity, but no later than before every Air Expeditionary Force (AEF) pair, if sustainable." (AFI 10-401, 2006: 209) The AEFC fills and manages the IA taskings.

Junior Officer Definition

In this study, junior officers are defined as company grade officers who consist of Second Lieutenants, First Lieutenants, and Captains in the United States Air Force.

Individual Deployers and Deployment Types

The focus of this study is to determine the effects of IAs on retention. A limitation is that the DMDC data provided for this study does not identify IAs. To address this limitation the Individual Deployer (ID) definition from an AFIT Center for Operational Analysis study: Individual Deployer Personnel Analysis (Ahner, Heilmann, Parson, 2011: 4) was adopted to identify IAs. Individual Deployers (ID) are defined as:

"An Individual Deployer is a Service member deployed from their assigned Unit Identification Code (UIC) where less than five (5) percent of the Service members assigned to that UIC are deployed within a given month."

For the purposes of this study four deployment groups are identified and utilized to determine if there is a statistically significant difference in the odds of retention between the four deployment types. The groups consist of Individual, Unit, Both, and Non Deployers. Individual Deployers represent personnel who have completed at least

one Individual Deployment with no Unit Deployments. Unit Deployers consist of personnel who have completed at least one Unit Deployment and no Individual Deployements, these deployments encompass Air Expeditionary Force (AEF) taskings. Both Deployers consist of personnel who have completed at least one Unit and one Individual Deployment. Finally Non-Deployers consist of personnel who have not deployed.

How do Deployments Effect Retention?

In general, the literature describes a positive relationship between deployments and retention as well as reenlistment. In 2002 Hosek and Totten revealed that "reenlistment increased as the number of nonhostile deployments increased." (Hosek and Totten 2002, 58) Participation in nonhostile deployments has been demonstrated to increase retention rates. It has been demonstrated that United States Air Force Officers who deploy show a strongly decreasing likelihood of separation which is associated with an increasing number of nonhostile deployments. (Fricker, 2002: 31) Fricker observed a positive correlation between junior officer retention and deployments, but his study further revealed that hostile deployments mitigated the positive association between retention and deployment participation. More recently Hosek and Martorell's (2009) study indicated that, "…hostile deployment is associated with an increase in actual reenlistment for all branches." (Hosek and Martorell, 2009: 35). While these studies provide evidence that some deployment experience increases retention, other studies have determined that the frequency and number of deployments can affect retention negatively. Hosek and Mortell state: "This and previous studies have found that, in most

instances, deployment increased reenlistment. More precisely, having some deployment increased reenlistment, but extensive deployment can decrease reenlistment." (Hosek and Martorell, 2009: 72) So while deployments appear to positively affect retention, it is conjectured that there is a point where participation in multiple deployments begins to negatively affect retention rates.

These results go against the prevailing belief that deployments decrease retention: "Thus, in contradiction to the common consensus, deployment is not associated with higher separation." (Fricker, 2002: 31) Several possible explanations for these results were discussed in the literature. One possible reason for an increase in retention is that personnel who are deployed have an opportunity to exercise skills in a real world environment. "Probably the most frequently cited positive aspect of deployment in our focus group was the opportunity on deployments to apply training and preparation to real world situations and to participate in challenging and satisfying missions." (Hoske, Kavanagh, Miller, 2006: 48) Higher pay and pecuniary benefits were also discussed as possible benefits of deployment. Alankaya and Kilic found that officers that experienced a deployment in the last year of obligated service had 263% higher odds of retention versus officers that had not deployed. (Alankaya and Kilic, 2009: 58) However Hall found in his analysis that deployments did not significantly effect retention for Army Dentists in his unpublished thesis. (Hall, 2009: 30) In general the literature states that deployments positively influence the odds of retention.

Individual versus Unit Deployments

Based on previous studies it is possible to speculate that the odds of retention will differ between Individual and Unit Deployers. Literature discussing Unit Deployments

provides potential insight that could result in personnel being retained. Several studies have found that positive aspects of Unit Deployments consist of improved morale, *esprit de-core*, and Unit Cohesion. Cohesion is defined as "the bonding together of members of a unit or organization in such a way as to sustain their will and commitment to each other, their unit, and the mission." (Johns, 1984: ix) The bonds that are formed between deployed members were discussed in Hosek, Kavanagh, and Millers study: "Another positive aspect of deployment that was discussed by many focus group participants in all services was the chance to form strong bonds with colleagues and coworkers." (Hosek, Kavanagh, Miller, 2006: 51) Focus groups also revealed that "Personnel with whom we spoke noted that shared experiences and trials on deployment contributed to increased unit cohesion and camaraderie that lasted beyond the end of the deployment and was highly valued by service members. Focus group participants commented that, while on long deployment, a member's unit becomes like his family. As a result, members come to rely on each other for support, comfort, and survival." (Hosek, Kavanagh, Miller, 2006: 51) Personnel who had deployed in both hostile and nonhostile deployments cuted this as a positive aspect of deployments. Based on the literature it would appear that concepts such as cohesion, and morale would be stronger for Unit Deployers and we could expect increases in the odds of retention for Unit Deployers versus Individual Deployers. However, several studies have found the opposite to be true, Fricker and Buttrey discovered in their 2008 study that: "Overall, we can see the same basic result with the junior officers that was seen among the enlisted population: IAers are retained at higher rates than non-IAers." (Fricker, Buttrey, 2008: 19) They further state that: "In fact, in almost all of our comparisons, the retention rates of those who have had one or

more IA deployments were higher than their Navy colleagues who have only been on conventional Navy deployments. (Fricker, Buttrey, 2008: 27) Paissant who completed a thesis on Navy Junior Officer retention discovered that IAs had higher retention rates versus Unit Deployers, "In fact, we see that the odds of retention are higher for officers who go on IA deployments" (Paissant, 2008: 37). In his study he countered a common belief in the Navy that IA deployments would result in lower retention rates, "IA Deployments do not appear to result in higher junior officer loss rate." (Paissant, 2008: 37).

There are several positive aspects to being on a Unit Deployment. Morale and cohesion are highlighted as benefits of deploying with a Unit and the close relationships which are developed can result in positive effects that increase retention. However, other studies have found that retention rates are higher for IA deployers, possible explanations include the fact that IA deployers may be self-selected or volunteers for deployments. Actual effects are not discussed. Both Deployers have not been identified specifically in previous retention studies and the effects of both ID and UD deployments on retention have not been determined as of yet.

Deployers versus Non Deployers

Previous studies have contrasted the difference in retention rates between personnel who have deployed compared to personnel who have not deployed. In 2002 Fricker's retention study determined that "…those who deploy remain in the service at higher rates than those who have not deployed." (Fricker, 2002: 31). Hosek, Kavanagh, and Miller provide a possible explanation for this relationship in their 2006 study: "According to focus group participants, troops who have deployed together, often in

difficult and life threatening situations, form strong bonds that are unlike those they share with nondeployed personnel, even if those nondeployed personnel were in their unit before the deployment. Some nondeployed personnel reported facing mild resentment from their colleagues who had deployed and felt that the nondeployed had "shirked" their duty in some way." (Hosek, Kavanagh, Miller 2006: 48) While these relationships support Fricker's findings, it is interesting to note there is evidence that deployments affect everyone whether they deploy or not. "Military personnel who did not deploy still reported that increases in operational tempo have affected their workload, in the form of longer work hours and increased work pace." (Hosek, Kavanagh, Miller 2006: 91) The effects of OPTEMPO and PERSTEMPO on retention have been discussed at length in previous studies and are defined as: "the rate of military operations as measured by deployments, training exercise, TDY assignment, and work hours." (Huffman, Adler, Dolan, Castro, 2005: 176) Personnel who remain at home station after others have left on deployment are required to manage the same workload with fewer personnel and resources. Previous studies have determined "High operational tempo and long work hours are aspects of military life that affect all personnel, deployed and non-deployed." (Hosek, Kavanagh, Miller, 2006: 91) It is possible to conjecture that the odds of retention might be lower for non-deployers versus deployers.

Based on the literature, it is assumed that personnel who deploy will have higher retention rates versus personnel who have not deployed. As stated above, deployments affect both personnel who deploy as well as personnel who remain at home station. It has been revealed through discussion groups that deployers develop close bonds while on deployment and upon returning have a diminished opinion concerning personnel who

have not deployed which could disrupt work relationships. Increasing OPTEMPO and PERSTEMPO are issues for all personnel whether they deploy or not. Based on this information it is possible to conjecture that retention might be lower for non-deployers. Other variables, besides deployment type, that effect retention have been studied and are discussed in the following paragraphs.

Other Variables that may Effect the Odds of Retention

Other variables besides deployment type have also been observed in the literature. Variables that are identified for this study are Pay Grade, Gender, Marital Status, Commissioning Source, and Career Group. Further discussion based on literature is provided below.

Pay Grade

Several studies have determined that pay has a major effect on retention. Boesel and Johnson found in their 1984 study that "The pecuniary variables are found to be the most important determinants of reenlistment, while attrition seems to be more heavily affected by individual characteristics." (Boesel and Johnson, 1984: ii). In an earlier study Chow and Polich determined that "The level of military compensation has a substantial effect on the reenlistment rate… most significant out of 23 explanatory variables." (Chow and Polich, 1980: 35). More recent studies have found that "…service members receive higher pay while deployed, and the higher pay helps to offset the negatives of hostile deployment." (Hosek and Martorell, 2009: 72). Personnel who deploy receive higher pay as well as tax free pay which can help offset the negative aspects of deployments. Some personnel have indicated that financial incentives were so significant

that they preferred to deploy even if they were separated from their families. Other personnel however were not as enthusiastic about the pay and indicated that it wasn't enough to make them want to deploy. (Hosek, Kavanagh, Miller, 2006: 52). Hosek, Kavanagh, and Miller's focus groups reveal that pay has a significant effect on retention; however it is worth noting that increased pay is not valued by all personnel. Pay is observed in this study through the Pay Grade variable. Military pay is based upon rank and years of service, the higher an individual's rank and the longer the time in service, the higher the pay. The pay grade variable will be observed to determine if a higher pay grade affects the odds of retention for junior Air Force Officers. Even though Pay has been demonstrated as a significant variable in determining retention other variables also affect retention rates. In Moore's Socio-economic study she identified a "pride in service" variable that was more powerful than other variables in each of her models. Her study revealed that "noneconomic variables are more significant than are economic variables in predicting the likelihood that junior enlisted personnel will remain in the military. (Moore, 2002: 269) Based on her findings and the results of other literature several noneconomic variables are explored in this study and are discussed below.

Marital Status

Marital status has been identified in several studies as a significant variable that effects retention rates. In 1980, Chow and Polich discovered that "personnel with dependents have uniformly higher reenlistment rates than those without dependents, regardless of discrepancies between perceived and actual regular military compensation (RMC)." (Chow and Polich, 1980: 19) They further state that reenlistment rates are higher among personnel with one or more dependents. (Chow and Polich, 1980: 9) In

2002 Hosek and Totten determined that deployment was associated with higher reenlistment rates for members with dependents and that over all reenlistment was higher for personnel with dependents compared to those without dependents. (Hosek and Totten, 2002: 50, 60) Moore's 2002 retention study determined that "marital status is the second most important demographic variable in explaining who will remain in the military. This is particularly true in the Air Force, where the beta coefficient for marital status is .172." (Moore, 2002: 272) Marital status was second to the "Pride in Service" variable which was the strongest variable in all of Moore's models. (Moore, 2002: 269) Fricker's 2002 retention study revealed that "Across all services and ranks, officers with families are more likely to remain on active duty compared to their single colleagues." (Fricker, 2002: 65) Thesis work has found relationships between marital status and retention. Hall found that dentists with families were less likely to leave the military than single dentists; his study found that the odds of leaving the military for personnel who were married were 36% lower than personnel who were single. (Hall, 2009: 30) Alankaya and Kilic determined that single officers without dependents had 74% lower odds of staying and single officers had 23% lower odds of staying compared to married officers. (Alankaya and Kilic, 2009: 57) A similar relationship was also found in Celik and Karakaya's thesis; the demographic variables in their study suggested that female, single, without-child officers were less likely to stay than male, married, with-child officers. (Cellik and Karakaya, 2011: 99) Cerman (2005) found in his study of retention and promotion that "Being married increased the probability to retain by 0.077 (13.41%) when compared to being single, all else being equal." (Cerman, 2005: 83) Based on the literature marital status is positively associated with retention. Other studies explore the

stresses of family separation which can lead to lower retention rates. Adler and Costro state that "In preparing for deployment, the biggest stressors for soldiers are dealing with family issues." (Adler and Castro, 2001: 2) Hosek, Kavanagh, and Miller learned from their discussion groups that "For many service members with whom we spoke, separation from family and friends was cited as the most difficult and negative aspect of deployments." (Hosek, Kavanagh, Miller, 2006: 42) They further state that "Of the negative features of deployment, separation from family was probably the most significant complaint that we heard from focus group members, especially those who deploy, and one of the most frequently given explanations by those planning to leave the service." (Hosek, Kavanagh, Miller, 2006: 90) Huffman, Adler, Dolan, and Catro's study revealed that family concerns were one of the major themes found for junior officer who intended to leave the military. (Huffman, Adler, Dolan, Castro 2005, 195) However regardless of these concerns, based on the findings stated earlier marriage is associated with higher retention rates for deployed personnel. Boesel and Johnson in their 1984 study determined that even though personnel complain about stress on their families, these complaints do not necessarily lead to lower retention rates: "Although complaints about relocation and family separation are prominent in military surveys, these factors turn out in multivariate analysis not to be powerful predictors of reenlistment." (Boesel and Johnson, 1984: ii) Chow and Polich also determined that "It appears that most of the aspects of service environment measured in this study – working in a rotation-imbalanced specialty, family separations, stationing outside the United States, and long hours of work have very little detrimental effect on reenlistment rates." (Chow and Polich, 1980: 37)

It is interesting to note that even though family separation and stress on families are identified as negative aspects of deployment, the literature has indicated that marriage has a positive effect on retention rates.

Gender

The literature has shown that gender is a variable of interest that influences retention rates. Moore's 2002 study shows that "…males are more likely to indicate a willingness to remain in the military than females." (Moore, 2002: 266) In his 2002 study Fricker discovered that "Both the Army and Air Force have higher separation rates for junior and midgrade female officers compared with male officers…" (Fricker, 2002: 67) In other thesis work gender has shown varying results. Hall's study of the retention of USA active duty dentists revealed that gender did not have a significant effect on retention. (Hall, 2009: 30) However Alankaya and Kilic found that female officers have 45% lower odds of retention than males in their logistic regression analysis of U.S. Naval Academy graduates. (Alankaya and Kilic, 2009) The literature has provided varying results on how gender effects retention and this variable is explored in this study.

Career Groups

Another variable of interest in this analysis is that of Career Groups. The 2011 Air Force Officer Classification Directory released by Randolph Air Force Base was used to identify and sort Junior Officers into their respective career Groups. This study compares Operations, Logistics, Support, Acquisitions, and Special Investigations career groups to determine if the odds of retention differ between groups. Fricker's 2002 study determined that "For Junior officers there are relatively few differences in deployment effects by occupational category, both between occupations within any particular service

and between services for any particular occupational category." (Fricker, 2002: 41) Fricker's results were based on Navy personnel and it is possible that there is a difference in the odds of retention between Career Groups for the Air Force. Alankaya and Kilic found in the 2009 thesis that Surface warfare and supply officers demonstrated lower odds of retention versus other Naval specialties. (Alankaya and Kilic, 2009: 57) The Air Force Personnel Center (AFPC) identifies stressed career fields on their website which provides demographics on the Air Force's current force structure. The AFPC criteria used to select stressed career fields consist of three factors: very high ops demand, required versus funded manpower (stress factors), and finally personnel inventory/retention. (AFPC, 2011) Career fields identified as stressed career fields under the Operations Career Group are Control and Recovery, Airfield Ops, and Intelligence. Career fields identified as stressed career fields under the Support Career group consist of Civil Engineers, and Public Affairs. The Acquisitions Career Group has one stressed career field, Contracting. These findings are based on reports for 2011 and 2010.

Commissioning Source

The last independent variable identified for this study is that of commissioning source. Fricker found in his 2002 study a difference in the odds of retention between officers who graduated from their service's military academy. "Finally, in the junior officer models there are differing effects for those officers who graduated from their service's military academy. West Point graduates in the Army are more likely to leave active duty after their minimum service obligation as compared with their nonacademy peers. In the Marine Corps the effect is the opposite; in the Navy and Air Force the effect is statistically insignificant and the estimated odds ratios are very close to one." (Fricker,

2002: 67) Fricker's sample for his study consisted of junior officers who commissioned after December of 1986 whose initial service obligation ended before September 1998. Commissioning source was also found to be a significant predictor in Hall's thesis, personnel who graduated from the Military Academy demonstrated higher odds of retention compared to ROTC graduates. (Hall, 2009: 31) Celik and Karakaya's analysis of retention demonstrated that commissioning source was significant for Surface Warfare Officers in the Navy and that personnel who commissioned through a Military Academy demonstrated 192% higher odds of retention versus other commissioning sources. (Karakaya and Celik, 2011: 58) This study will look at three primary commissioning groups identified from the personnel records. The first group consists of Air Force Academy graduates. The second group consists of Reserve Officer Training Candidates (ROTC), which includes both personnel who received scholarships and those that did not. Finally, the last group consists of personnel who were identified as commissioning through Officer Training School (OTS), Air Force National Guard Academy (ANGA), Direct Accession, and all others.

Survey Analysis

Organizational behavior is a field of study that is devoted to understanding, explaining, and exploring attitudes and behaviors of both individuals and groups in a variety of organizations. (Colquitt, LePine, Wesson: 2009, pg 7) Turnover as defined by Price is "the movement of members across the boundary of an organization." (Price, 2001: 600) Turnover consists of both voluntary and involuntary actions in which a member may exit an organization. In his research Price identifies four determinants of

turnover: job satisfaction, organizational commitment, search behavior, and intent to stay. (Price, 2001: 608) Colquitt, LePine, and Wesson (Colquitt, Lepine, Wesson, 2009: 584) provide definitions for the above determinants as: Job satisfaction represents how an individual feels and thinks about their job. Organizational Commitment is an employee's desire to remain a part of an organization. (Colquitt, Lepine, Wesson, 2009: 587). Price defines search behavior as the degree to which an individual is searching for other jobs; and intent to stay as the extent to which an employee plans to remain with their current organization. (Price, 2001: 608, 609)

A 1981 study on turnover consisted of 1,091 registered nurses in seven hospitals utilized multiple regression and path analysis to determine what variables had the largest impact on turnover. (Price, Mueler, 1981: 543, 551, 552) Price and Meler (1981) determined that intent to stay had the largest total impact on turnover followed by opportunity and general training. Job satisfaction was found to not have a significant influence on turnover; however it served as an important mediating variable between the other determinants and turnover and had an overall large effect. (Price, Mueler, 1981: 558,559) A 1983 study analyzed survey responses of 260 Navy men determined that intent had a significant effect on actual behavior. (LaRocco, 1983: 818) A Meta-analysis of voluntary turnover was conducted by Licklider in 2011; her research encompassed military studies published between 1973 and 2009. Her research demonstrated "that turnover intentions and turnover had the strongest positive relationship with an 80% credibility range of 0.43 to 0.58." (Licklider, 2009: iv) She also stated that turnover intentions were the most studied independent variable for turnover. (Licklider, 2009: 25) Based on previous literature on turnover intentions and military populations, as well as

the results of the logistic regression analysis survey results were pulled from Status of Forces Surveys from fiscal year 2003 to 2009. Questions pulled from the surveys measure satisfaction and retention intention and the specific questions as well as their scales will be discussed further in the methodology section.

Turnover theory has evolved over time and several turnover models have been explored contributing to a large and rich body of theory and literature. Instead of developing measures from survey data, this thesis uses logistic regression analysis and statistical modeling techniques, through deployment, personnel, and pay data to identify factors that impact retention. Personnel records, pay, and deployment data were analyzed to determine what factors impacted retention; these results are then compared and contrasted with the limited surveys completed by the overall population considered. This research developed an analytical tool which provides insight to decision makers on what factors, including deployment type, career group, gender, pay, marital status, and commissioning source, effect the odds of retention for Air Force Junior Officers.

Chapter Summary

This chapter discussed the different deployment categories for analysis. Literature was reviewed to identify previous research that addressed what effects, if any, Deployments, Pay, Gender, Marital Status, Career Group, and Commissioning Source have on retention. Behavioral theory and survey analysis were explored. In the following chapter the methodology and the model used for this thesis are discussed.

III. Methodology

Chapter Overview

This chapter discusses the procedures used to conduct this research. First Human Subjects research is reviewed. Next the data utilized in this data is discussed as well as its limitations. Fricker 2002 and Paissant's 2008 retention models are reviewed and research models are proposed for this study. Next experiment design is presented and dependent and independent variables are discussed as well as limitations in this study and key assumptions. Finally the statistical analysis utilized is reviewed as well as the methodology employed to generate results. Finally, research questions and hypothesis statements are presented.

Human Subjects Information

Human subjects consist of the personnel represented by the DMDC personnl, pay, and deployment records; as well as all of the respondents to the Status of Forces Surveys. An exemption package for human subjects research was submitted and approved by the AFIT Institutional Review Board (Appendix A). The DMDC data used in this research did not contain any unique identifiers such as Social Security Numbers or Names.

Data

This study uses the same data set from the Ahner, Heilmann, and Parson "Individual Deployer Personnel Analysis" study (2011). All Active Duty Personnel files from FY2000-FY2009, Deployment records from the Contingency Tracking System from 11 Sept, 2001-January 2010, Active Duty Pay files from FY2000-FY2010, and Status of

Forces Survey Response data from 2002-2010 were used in their analysis. A subset of their data was provided for this study representing all Active Duty Air Force Officers. The records were initially separated by deployment type: Individual Deployer, Unit Deployer, Both Deployer, and Non Deployer and placed into separate spreadsheets where the data was cleaned to capture Air Force, Active Duty, Junior Officers. The initial sample size consisted of 49,540 Officer Records; 47,099 were removed and the final sample size consisted of 2,441 records. The data alone did not indicate whether a member was deployed as an IA. Instead an Individual Deployer was identified based on Ahner, Heilmann, and Parson's definition: "An Individual Deployer is a Service member deployed from their assigned Unit Identification Code (UIC) where less than five (5) percent of the Service members assigned to that UIC are deployed within a given month." (Ahner, Heilmann, Parson, 2011: 4) The following paragraph describes how the data was sorted and cleaned.

The Data was first sorted by the Uniformed Service Organization Component Code which indicates whether a member is Guard, Reserve, or Regular (Active Duty) Air Force; all Guard and Reserve members were identified and removed. (DoDI 1336.05, 2009: 8) Records were next sorted by pay grade identifier and all records except for 01-03 (2^{nd} Lieutenant to Captain) were removed. The available data set covered the time frame from fiscal year 2000 to fiscal year 2009. Errors and null values in the data were removed from the Deployment End Date Column and all records that had a deployment end date past 12/30/2006 were removed in order to capture a three year retention decision window from the end of the data which ended on 12/30/2009. Errors in other categories such as Gender, Marital Status, Dependents Quantity, Military Accession Source, and the

Primary Service Occupation code were also removed before computing and coding whether members were retained or not. Finally the data was sorted by Service Obligation End Dates which represent "The date when an officer will fulfill his or her active service obligation and be eligible for separation" (DoDI 1336.05, 2009: 16). Records that had a service obligation date that extended beyond their 3 year retention window were removed based on the fact that they were not eligible for separation.

The table below shows the total number of records removed and the final sample sizes used for this study for each deployment category.

Table 1: Deployment Type Sample Sizes

	ID	UD	BD	NON	Total
Initial Data Set	16,277	21,105	11,908	250	49,540
Records Removed	15,646	19,918	11,298	237	47,099
Sample Sizes	631	1,187	610	13	2,441

Survey data was drawn from Status of Survey results from Fiscal years 2003-2009. The unique identification numbers from the personnel records identified in the samples above were used to pull responses from the survey data. Data was sorted by deployment type, gender, career group, marital status, and commissioning source. Survey responses were then filtered and all null values (non-responses) were removed. The sample sizes are recorded in the table below.

Table 2: Survey Sample Sizes

Category		Initial Sample	Null Values Removed
Career Group	Operations	426	214
	Support	158	88
	Logistics	68	38
	Acquisitions	47	25
	Special Inv	9	5
Deployment type	ID	165	81
	UD	237	130
	BD	168	87
	ND	8	7
Gender	Male	469	246
	Female	148	80
Marital Status	Married	469	252
	Not Married	214	104
	Seperated (Divorced)	25	13
Commissioning Source	Academy	223	119
	ROTC	304	165
	OTS, ANGA, Other	181	86
Pay Grade	2nd Lieutenant	14	7
	1st Lieutenant	109	47
	Captain	585	316

Data Limitations

From the initial data, some fields did not remain constant between the different data sets (personnel records versus deployment records). For this reason Gender, Rank, Marital Status, Accession Source, Record End Dates, and Service Occupation Codes were determined based on Active Duty Personnel files. Deployment end dates were drawn from the Deployment records. It is assumed that the personnel records contained fewer errors versus the deployment records. A major limitation for the data is the fact that Deployment Manpower Data Center (DMDC) data was used for this study. IAs were not specifically identified in the records; however the Individual Deployer definition from Ahner, Heilmann, and Parson's study was utilized to identify IAs. While the Air

Force might have its own method of tracking IAs, that data was not available for this study and it is assumed that the individual deployer definition is sufficient to determine retention rates for IA Air Force Junior Officers. The survey data is a subset of the data utilized for the regression model. All available survey responses were pulled based on personnel identified in the regression data set. The survey sample size was smaller than the initial sample, also several of the records identified in the survey data did not answer the survey and were removed from the sample which reduced the sample size of the survey data.

Experimental Design Logistic Regression

The dependent variable for the logistic regression analysis was a dichotomous dependent variable represented by Retained = 0 and Not Retained = 1. Two criteria were established to determine retention for personnel who had deployed and a three year retention window was observed for personnel who were not deployed. Deployed personnel were identified as not being retained based on two criteria drawn from their records:

1: The records end date had to occur before the end date of the data set, 30 December 2009.

2: If the first condition was satisfied then the end of the deployment date was observed and if the record ended within three years of the deployment return date they were considered to be not retained.

If a record did not meet both criteria they were coded as retained. To summarize, if an individual returned from a deployment and their record ended within three years of

their return date they were coded as not retained. Records that extended beyond the end of the data were assumed to be retained based upon the simple fact that there was no evidence available to determine otherwise.

Retention for Non Deployers was determined based on a retention window. A retention window of 3 years was observed from the date when a member first attained the rank of Captain. If the record ended within three years from their date of rank they were considered not retained, if the record didn't end within three years the member was coded as retained. Currently Air Force officers reach the rank of Captain at 4 years and based upon either their commissioning source or AFSC, they will serve an initial commitment of 4-7 years. Rather than complicate the model by trying to address every possible contingency the Officer Active Service Obligation End Calendar Date (DODI 1336.05) was observed to determine if an individual was eligible to separate or not. If the service obligation date extended beyond the three year window the individual was assumed to be ineligible for separation and was removed from the sample.

The independent variables for the logistic regression analysis consisted of Deployment Type, Career Groups, Gender, Commissioning Source, Marital Status, and finally Rank. These variables were chosen based upon their possible relevance to member retention decision as discussed in the literature review as well as the availability of the data. Each variable is briefly described below along with their coding scheme for the analysis. A general rule of thumb regarding minimum sample sizes for a Logistic regression is 10 samples per independent variable. Peduzzi, Concator, Kemper, Holford, and Feinstein (1996) explored this assumption through the use of simulation and determined that problems can occur when a logistic model contains few events per

variable relative to the number of independent variables. As the number of events per variable decreased "the bias of the regression coefficients increased, often yielding extreme values for the maximum likelihood estimates." (Peduzi, et al., 1996: 1377) This analysis utilizes the rule of thumb that 10 samples per independent variable were adequate for statistical testing purposes. A table is provided on the following page that shows the sample sizes for all of the independent variables.

Table 3: Sample Sizes for Independent Variables

	Sample Size	Percentage
Retained	1657	68%
Not Retained	784	32%
Individual Deployer	631	26%
Unit Deployer	1187	49%
Both Deployer	610	25%
Non Deployer	13	1%
Male	2102	86%
Female	339	14%
Married	1682	69%
Not Married	660	27%
Seperated/Divorced	99	4%
Military Academy	968	40%
ROTC	974	40%
OTS/ANGA/Other	499	20%
2nd Lt	41	2%
1st Lt	285	12%
Capt	2115	87%
Operations	1510	62%
Logistics	237	10%
Support	518	21%
Acquisitions	141	6%
Special Investigation	25	1%
Total Sample Size	2441	

Model Discussion

The logistic regression model for this study is developed to determine what factors effect retention. The model is built to capture what effects the independent variables (Deployment Type, Gender, Marital Status, Pay Grade, Career Group, and Commissioning Source) have on the odds of retention for Air Force junior officers. In

order to capture the effects of deployment type on the odds of retention a three year retention window is observed. This retention window begins at the end of a member's deployment. If the individual's record ends within the three year window it is assumed that they were not retained, if the pay record continues beyond the three year window then it is assumed that they were retained. Junior Officer's Service Obligation End Dates are observed to determine if the officer was eligible to separate from active duty, if the obligation date extended beyond the end of the retention window the officer was assumed to be ineligible to separate and was removed from the sample. Independent variables that are utilized based on Fricker (2002) and Paissant's (2008) studies include Career Field, Gender, Marital Status, and Commissioning Source. Pay grade was added to this model to determine if pay had an effect on the odds of retention for Air Force Junior Officers. The results of the logistic regression models then drive the analysis of the survey data to determine if actions compliment or contrast with intentions captured by the survey data.

Fricker (2002) developed a retention model for a RAND study in an effort to observe how deployments effect the odds of retention for Navy Junior Officers. In 2008 Paissant expanded the model to determine how IA deployments effect the odds of retention for Navy Junior Officers in the Surface, Submarine, and Supply career fields. Paissant's results were included in Fricker and Buttrey's (2008) study on retention for Naval personnel. Fricker's (2002) model utilized a one year retention window after each junior officer's initial service obligation had ended and evaluated whether or not a record ended or continued past the one year retention window utilizing a logistic regression. Variables of interest in the model were Deployments, Gender, Family Status, Occupational Groupings, and Accession Source. (Fricker, 2002: 21-25) In 2008

Paissant expanded on Fricker's 2002 retention model to include IAs and his results were included in Fricker and Buttrey's 2008 study. Paissant's model observed a 7 year service window for Surface, Submarine, and Supply officers which consisted of 5 years of initial service followed by a 2 year window of optional service. If a record ended before the 7 year point it was considered to be not retained, if it remained it was retained. (Paissant, 2008: 22-25) Aviators were given a 10 year service window versus Surface, Submarine, and Supply officers due to longer service commitments. Logistic regression was utilized to determine the effects of IA deployments on retention. Independent variables analyzed in his model included Gender, Race, Family Status, and whether a member had Dependents or not. In 2009 Hall utilized logistic regression to predict retention for active duty dentists in the United States Army (USA) in an unpublished thesis. His model explored the effects of Sex, Age, Race, Family, Commissioning Sources, Dental Specialty Training, and the Effect of the Global War on Terror to determine what factors influenced the retention of USA dental officers. (Hall, 2009: 18) Another logistic regression retention analysis was conducted in 2009 to measure the effect of hostile deployments on Marine Corps officers who were graduates of the U. S. Naval Academy. Alankay and Kilic's 2009 study utilized three models which included Demographic, Service, and Deployment variables to explore the effects of the Global War on Terror on retention. (Alankay and Kilic, 2009: 41-45) Celik and Karakaya (2011) also explored the effects of Commissioning Source on the retention and promotion of Naval Surface Warfare Officers through multivariate regression. Variables of interest in their study included Commissioning Source, marital Status, Race, Gender, Educational Level, University Major, Prior Enlisted Service, and Lateral Transfers (moving to another Naval

career group). (Celik, Karakaya, 2011: 46-48) Based on previous regression studies of retention the two models are initially proposed for this study and are discussed in the following paragraphs.

The first logistic regression model explores the effects of deployments on retention, and is discussed below:

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Unit\ Deployer \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

$$+Individual\ Deployer \begin{bmatrix} 0 \\ 1 \end{bmatrix} + Both\ Deployer \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Figure 1: Effects of Deployments on Retention Model

The dependent variable, Retention, consists of the logged odds of a member being retained. The numerator of the dependent variable represents the probability that an individual was retained, the denominator represents the probability of not being retained. The independent variable for this model, Deployment type, consists of four categories of deployment which include Non Deployer, Unit Deployer, Individual Deployer, and Both Deployer. SPSS utilizes design variables to represent the four deployment categories which are presented on the table below.

Table 4: Deployment Model Variable Coding

	Unit_Dep	Ind_Dep	Both_Dep
Non Deployer	0	0	0
Unit Deployer	1	0	0
Individual Deployer	0	1	0
Both Deployer	0	0	1

The intercept for the logistic regression model is β_0. Unit Deployer, x_1, has a beta coefficient β_1 which is a binary variable representing: 1 if the individual was a Unit Deployer, 0 otherwise. Individual Deployer, x_2, has a beta coefficient β_2 which is a binary variable representing: 1 if the individual was an Individual Deployer, 0 otherwise. Both Deployer, x_3, has a beta coefficient β_3 which is a binary variable representing: 1 if the individual was a Unit Deployer, 0 otherwise. SPSS will provide the odds ratio for each deployment category using Non Deployers as the reference group.

The second model explores how other variables of interest effect the odds of retention for Air Force Junior Officers, the model is provided below and discussed:

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Gender\begin{bmatrix}0\\1\end{bmatrix} + Career\ Group\begin{bmatrix}0\\1\end{bmatrix}$$
$$+Marital\ status\begin{bmatrix}0\\1\end{bmatrix} + Deployment\ Type\begin{bmatrix}0\\1\end{bmatrix}$$
$$+Pay\ Grade/Rank\begin{bmatrix}0\\1\end{bmatrix} + Commissioning\ Source\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 2: Effects of Other Variables of Interest on Retention Model

The dependent variable, Retention, consists of the logged odds of a member being retained. The numerator of the dependent variable represents the probability that an individual was retained; the denominator represents the probability of the member not being retained. The independent variables consist of Gender, Marital Status, Deployment Type, Pay Grade/Rank, Commissioning Source, and Career Group.

The independent variable Gender, x_1, has a beta coefficient β_1, which is a binary variable representing 1 if an individual was male, 0 for female.

Career group, x2, has a beta coefficient β_2, which is a binary variable with a 1 indicating membership in a specific career group, 0 otherwise. There are five career groups identified for analysis in this study and a separate model will be run for each of the career groups. For example, the first model will have Operations as the independent variable x_2; the second model will have Support as the independent career group, the third model will have Logistics as the career group, the fourth model will have Acquisitions as the career group, and the final model will have Special Investigations as the career group

Marital Status, x_3, has a beta coefficient β_3, which is a binary variable with a 1 indicating membership in a specific marital category, 0 otherwise. This variable consists of three categories; Married, Not Married, and Seperated/Divorced which are represented in the table below.

Table 5: Marital Status Variable

Seperated/Divorced	0	0	0
Married	0	1	0
Not Married	0	0	1

Deployment type, x_4, consists of four categories which have binary beta values represented by β_4 which are presented in the table on the following page.

Table 6: Deployment Type Variable

	Unit_Dep	Ind_Dep	Both_Dep
Non Deployer	0	0	0
Unit Deployer	1	0	0
Individual Deployer	0	1	0
Both Deployer	0	0	1

The independent variable Pay Grade/Rank, x_5, has a beta coefficient β_5, which is a binary variable with a 1 indicating membership in a specific pay grade, 0 otherwise. This variable consists of four categories which are presented on the table below.

Table 7: Pay Grade Variable

2nd Lieutenant	0	0	0
1st Lieutenant	0	1	0
Captain	0	0	1

The independent variable Commissioning Source, x_6, has a beta coefficient β_6, which is a binary variable with a 1 indicating membership in a specific commissioning group, 0 otherwise. The information is provided on the table below.

Table 8: Commissioning Source Variable

OTS, ANGA, Other	0	0	0
Military Academy	0	1	0
ROTC	0	0	1

Based on the results of the above models a parsimonious model is developed and analyzed. Relationship variable models are then built and further analysis is explored.

Finally, findings from the above models are compared and contrasted with the sample's survey results.

Deployment Type

There were four samples identified for this independent variable. Each sample was identified in the data set provided by Ahner, Heilmann, and Parson's study. Individual Deployers consisted of personnel who had been deployed only as individuals and had not participated in Unit Deployments. Unit Deployers consisted of personnel who had only been deployed with a Unit and had not participated in an Individual Deployment. Both Deployers were identified as personnel who had been on at least one Unit and at least one Individual Deployment. Finally Non Deployers consisted of personnel who were present in the personnel records but did not have any deployment records. Each sample was coded separately with a 1 indicating that a record belonged to a specific group and a 0 indicating that the record did not belong to that group.

Career Groups

Five Career Groups were identified for analysis, Operations, Logistics, Support, Acquisitions and Special Investigations. Retention decisions for five career groups were compared to determine if there was a statistically significant difference in the odds of retention between the groups. Each career group was identified by the first numeric identifier in the Air Force Specialty Type Code (AFI 36-2101, 2010: 12). 1XXX represented personnel in the Operations Career Group, 2XXX represented personnel in the Logistics Career Group, 3XXX indicated personnel in support Career Group, 6XXX indicated personnel in the Acquisitions Career Group, and finally 7XXX represented personnel in the Special Investigations Career Group. In some cases an alpha character

preceded the first numeric character in the AFSC which symbolizes "An ability, skill, special qualification, or system designator not restricted to a single AFSC." (AFI 36-2101, 2010: 12) The first numeric character following the alpha character was still used to identify a specific Career Group, an example would be X1XXX or X2XXX where the 1 would indicate operations and the 2 would indicate logistics respectively. The following career groups were excluded: 4XXX Medical or Dental, 5XXX Legal or Chaplain, 8XXX Special Duty Identifier, 9XXX Reporting Identifier. Members in the 4XXX and 5XXX follow different recruitment and retention procedures for officers versus the other career groups and would not fit our model. 8XXX and 9XXX are also excluded since they are temporary duty identifiers and not specific career fields. Each respective career group was coded as a separate variable with a 1 identifying membership to the specific career group and a 0 representing that they were not in that respective career group.

Gender

If the personnel record identified a member as male they were coded as a 1, if female then 0.

Marital Status

The personnel records identified several different codes for marital status. In an effort to simplify and reduce the number of different marital categories three categories were developed and coded respectively. The first category, Separated, consisted of personnel who had previously been married and had been separated for a variety of reasons (divorced, widowed, or annulled). The second category, Married, consisted of personnel that were identified in the personnel records as being married. Finally the last

category, Not Married, consisted of personnel who had never been married. Each respective category was coded as a 1/0 variable.

Pay Grade/Rank

Pay grade consisted of three groups, 2nd Lieutenants, 1st Lieutenants, and finally Captains. Personnel records were used to determine a member's current pay grade. Each respective group was coded as a 1/0 indicator variable with a one representing it as being part of a specific pay grade and 0 being other.

Commissioning Source

Commissioning Source was identified from personnel records and were organized into three major groups. The first group consisted of personnel who graduated from the United States Air Force Academy. The second group consisted of personnel who commissioned through ROTC to include both scholarship and non-scholarship students. The final group consisted of personnel who were commissioned through OTS, ANGA, and other commissioning sources identified in personnel records which did not include ROTC or Academy commissioning sources.

Limitations and Assumptions

This section will further define and discuss the limitations and assumptions presented in chapter one. The first limitation of this study is that it does not provide exact causation. A Turnover Theory model is not utilized in this analysis to explore why personnel depart from the military, instead an analysis is performed to gain insight into what independent variables significantly effect the odds of retention in this analysis. It is assumed that the retention decision discussed above is sufficient for identifying when

personnel separate from the military. A limitation of this definition is that the model does not identify voluntary or involuntary turnover, it is assumed that for the purposes of this analysis that a member is recognized as not being retained regardless of the type of turnover that they experience. A major assumption of this analytical model is that Ahner, Heilmann, and Parson's (2011) Individual Deployer definition is sufficient for identifying IAs within the data set. Further assumptions address the limitations of the data. As discussed earlier there were various errors identified in the data and a large portion of the population was removed due to errors. It is assumed that the sample size above is adequate for the purposes of this analysis. Further limitations include the inability to identify personnel that were separated from service due to Force Shaping initiatives which occurred during the timeframe of the data set. Maj Gibson from AF/A1PPS provided a talking paper dated 4 December 2009 which outlines Air Force Force Shaping initiatives from fiscal year 1990-2010. (Gibson, 2009) This study acknowledges that voluntary separation programs were used to reduce Air Force end strength from 1990-2010 and that Reduction in Force programs that targeted Junior Officers across all the commissioning years in this study were conducted from fiscal year 2007 to present. It is not possible to identify these individuals in the data set, nor is it known if the individuals who participated in the Force Shaping programs were deployed before they were separated. A vital assumption is made that these force shaping initiatives do not have a statistically significant effect on the results of this analysis. A stop loss is documented as occurring from "March 2003 through June 2003" (Committee on Appropriations, 2010: 297) in support of Operation Iraqi Freedom, due to fact that the stop loss only covered four months of this study it is assumed that the stop loss does not statistically effect the

results of this analysis. Finally, external factors such as current economic conditions and job availability were not considered for this study. It is assumed that the data present and the model utilized are adequate to determine how deployments, gender, pay grade, commissioning source, marital status, and job group effect the odds of retention for Air Force Junior Officers.

Statistical Analysis Logistic Regression

Logistic regression was appropriate since the dependent variable in this analysis is dichotomous: 1 being retained, 0 being not retained. This section provides a brief description of logistic regression, its assumptions, and limitations.

Why a logistic regression? Initially it may appear that a linear regression will be adequate in conducting an analysis with a dichotomous dependent variable, however this approach has several problems. Two of which are that a linear regression can produce probabilities outside the range of 0 and 1 which have no meanings, and the second being that a dichotomous dependent variable violates linear regression assumptions. The first problem arises from the fact that we are observing probabilities or likelihood in our model, for example the probability of falling into category 1 versus category 2. Probabilities have maximum and minimum values of 0 and 1, yet a linear regression line can extend upwards towards positive infinity and downwards to negative infinity as the values of the independent variables increase/decrease indefinitely. This can cause a linear regression to give predicted values of the dependent variable above 1 and below 0. (Pampel, 2000: 2) Predicted values of the dependent variable that extend below 0 and above 1 do not make sense when dealing with probabilities, they are not useful. Another

major issue is that using a dummy dependent variable violates the assumption of normality and homoscedasticity. "Even in the population, the distribution of errors for any X value cannot be normal when the distribution has only two values. The error term also violates the assumption of homoscedasticity or equal variances because the regression error term varies with the value of X." (Pampel, 2000: 9) To address these issues, the model is transformed using a logit transformation which "provides many of the desirable properties of a linear regression model. The logit, g(x) is linear in its parameters, may be continuous, and may range from $-\infty$ to $+\infty$, depending on the range of x." (Hosmer and Lemeshow, 1989: 6; Neter, et al., 1983: 363) The logistic regression model is as follows (Hosmer and Lemeshow, 1989: 6; Neter, et al., 1983: 362):

$$E(Y) = \frac{e^{\beta_0+\beta_1 X}}{1+e^{\beta_0+\beta_1 X}} \qquad (1)$$

Where

E(Y)=the expected value of the response variable

B0=the intercept parameter

B1=the slope parameter

X=the independent variable

The formula for this transformation is expressed as a function *g(x)* and is shown below:

$$g(x) = \log_e\left(\frac{E(Y)}{1-E(Y)}\right)$$

Where E(Y)=the expected value of the response variable from (1)

Logistic regression was chosen to evaluate the binary retention variable used for this analysis based on two primary reasons, "First, from a mathematical point of view, it is an extremely flexible and easily used function, and second, it lends itself to a clinically meaningful interpretation." (Hosmer and Lemeshow, 1989: 6) The Logistics regression uses a sigmoidal, or tilted S curve, response function in which the parameters are derived through maximum likelihood techniques which are used to maximize the value of the log-likelihood function, "which indicates how likely it is to obtain the observed values of Y, given the values of the independent variables and parameters..." (Menard, 2002: 14) An optimal solution is solved through an iterative process in which an initial estimate is repeatedly tested and re-estimated until the change in the log-likelihood function becomes negligible resulting in a "solution that is said to converge." (Menard, 2002: 14)

Logistic Regression Assumptions

The logistic regression assumptions are as follows: 1. Independence Among the Bernoulli observations. 2. All of the relevant terms of the model are specified. 3. The relationship between the logit of the dependent variable and the independent variables is linear. 4. Predictor variables are not linear dependent. 5. Large samples. Both the dependent and independent variables for this study are classified as 0/1 dichotomous variables with a 1 indicating success and a 0 indicating failure. (Ahner, Spainhour: 2011, 8) These assumptions are addressed in the following paragraphs.

1. Independence Among the Bernoulli Observations. A Bernoulli model consists of a "random experiment that can give rise to just two possible mutually exclusive and collectively exhaustive outcomes…" (Newbould, Carlson, Thorne, 2010: 151) Where P denotes the probability of success and 1-P denotes the probability of failure and the

random variable X takes on the value of 1 if the outcome of the experiment is a success and a 0 if it is not. All of the variables this study consist of Bernoulli Observations with 1 indicating membership to a specific category and a 0 indicating the other. The observations are also independent, a unique identifier was utilized to identify separate personnel and to prevent the same record from being utilized more than once when determining whether a member was retained or not.

2. All of the relevant terms of the model are specified. All of the independent variables as well as the dependent retention variable were identified and discussed in the Experiment Design portion of this thesis.

3. The relationship between the logit of the dependent variable and the independent variables is linear. A logit equals quite simply the logged odds of an event. To compute a logit you first need the probability of an event P_i which will indicate the probability of success, as well as $1 - P_i$ which will indicate the probability of failure. The equation is as follows: (Pampel, 2000: 10)

$$L_i = ln\left[\frac{P_i}{1 - P_i}\right]$$

Pampel further discusses the results of this approach and provides an excellent table to demonstrate the linearity assumption: "By taking the natural log of the odds eliminates the floor of 0 as much as transforming the probabilities into odds eliminates the ceiling of 1." This is demonstrated on the table on the following page: (Pampel, 2000: 14)

Table 9: Linear Relationship of Independent Variable

P_i	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
$1-P_i$	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1
Odds	0.111	0.23	0.429	0.667	1	1.5	2.33	4	9
Logit	-2.2	-1.39	-0.85	-0.41	0	0.405	0.847	1.39	2.2

The use of a logit demonstrated above shows how a linear relationship can be established based upon a dichotomous dependent variable. It is assumed for this study that the relationship between the logit of the dependent variable and independent variable is linear.

4. The predictor variables are not linear dependent. The predictor or independent variables for this study are not linear dependent. The independent variables for this study consist of dichotomous (0,1) indicator variables drawn from personnel and deployment records for Air Force active duty personnel which are not linear dependent.

5. Large samples. The sample size for the data set consists of 2,441 Air Force Active Duty Junior Officer records.

Goodness of Fit

For this study the goodness of fit of a logistics regression is observed based upon three statistical tests. First a model chi-square statistic is computed and a hypothesis test is conducted to determine if the model is statistically significant. Next, a Hosmer and Lemeshows test is conducted to determine whether our function fits across a large range of probabilities. And finally if the previous two tests are satisfied and the model is assumed to be a good fit for the data; the Wald Statistic is used to determine the

significance of the independent variables in the model. The three tests are discussed in greater depth below.

Based upon an observed pattern of occurrences, logistic regression utilizes a maximum likelihood function to find model parameters which maximize the probability of getting the observed outcome. (Pampel, 2000: 40, 41) For this analysis the observed pattern of occurrences will be the dependent variable, retention, which will establish the baseline log likelihood. When independent parameters are included in the model the model log likelihood is developed. The -2 Log Likelihood (-2LL) statistic is developed by subtracting the baseline log likelihood from the model log likelihood and multiplying the resulting value by -2. The -2 LL has an approximately chi-square distribution with degrees of freedom equal to the number of independent variables which can be used as a criterion for selecting parameters in the logistic regression model. (Ahner, Spainhour: 2011, 8; Pampel, 2000: 46; Menard, 2002: 20) The overall fit of the model can be tested with a chi-square goodness of fit test with the following hypothesis:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

SPSS provides the -2LL under the Iteration History table which can be "straightforwardly interpreted as the difference between a first model that contains only an intercept and a second model that contains the intercept plus one or more variables as predictors." (Menard, 2002: 22) The -2LL test statistic W is compared to the Chi-square statistic and if $W \geq \chi^2_{\alpha=0.05,df=n}$,where n = the number of independent variables, we reject the null hypothesis and conclude that the inclusion of the independent variables

allows us to make better predictions. SPSS summarizes the results of this hypothesis test in the "Omnibus Test of Model Coefficients" table and provides an associated p-value.

Once the independent variables have been added to the model SPSS can provide the Hosmer-Lemeshow goodness-of-fit statistic which is used to determine overall model fit. Hosmer and Lemeshow state that "$\hat{C}$, is obtained by calculating the Pearson chi-square statistic from the g x 2 table of observed and expected frequencies." (Hosmer and Lemeshow, 1989: 148)

The equation defined by Hosmer and Lemeshow is as follows:

$$\hat{C} = \sum_{k=1}^{g} \frac{(O_k - n'_k \overline{\pi}_k)^2}{n'_k \overline{\pi}_k (1 - \overline{\pi}_k)}$$

Where

$\hat{C}$ = Hosmer and Lemeshow goodness-of-fit statistic

n'_k = total number of subjects in the kth group

c_k = the number of covariate patterns in the kth decile

O_k= the number of responses among the c_k covariate patters from (1)

$$O_k = \sum_{j=1}^{C_k} y_j$$

O_k = the number of responses among the c_k covariate patters

$\overline{\pi}_k$ = the average estimated probability

Hosmer and Lemeshow state that "The advantage of a summary goodness of fit statistic like C is that it provides a single, easily interpretable value that can be used to

assess fit." (Hosmer and Lemeshow, 1989: 148) The North Carolina State University website provides an excellent SPSS tutorial and a description of how to interpret the Hosmer-Lemeshow Chi Square goodness-of-fit statistic. "Hosmer and Lemeshow's goodness of fit test divides subjects into deciles based on predicted probabilities…, then computes a chi-square from observed and expected frequencies. A probability (p) value is computed from the chi-square distribution with n degrees of freedom to test the fit of the logistic model." (Garson, 2011) For a well-fitting model the Hosmer and Lemeshow goodness-of-fit test statistic should be greater than 0.05. When the statistic is greater than 0,05 we fail to reject the null hypothesis that there is no difference between observed and model-predicted values; this implies that the model estimates fit the data at an acceptable level. Based on this result we can determine that model prediction is not significantly different from the observed values. (Garson, 2011)

When determining the significance of an independent variable SPSS computes and provides the Wald statistic which "is obtained by comparing the maximum likelihood estimate of the slope parameter, $\hat{B}_1$, to an estimate of its standard error. The resulting ratio, under the hypothesis that $B_1 = 0$, will follow a standard normal distribution." (Hosmer and Lemeshow, 1989: 16)

The equation that Hosmer and Lemeshow provide is below:

$$W = \frac{\hat{B}_1}{\widehat{SE}(\hat{B}_1)}$$

A major issue with the Wald test statistic is that when a large $\hat{B}$ is utilized the estimated standard error is inflated resulting in a failure to reject the null hypothesis even when it is false. The literature recommends the use of the likelihood ratio statistic when

determining the significance of an independent variable, however SPSS utilizes the Wald statistic which will be used in this analysis. "Nonetheless, statistical packages are often written to use a less computationally intensive alternative to the likelihood test, the Wald statistic, to test for the statistical significance of the individual components." (Menard, 2002: 43)

Logistic Regression Limitations

Logistic regression does not have a true R^2 measurement to describe the amount of variance explained by the model. Instead SPSS provides two pseudo R^2 measurements, namely the Cox-Snell and Nagelkerke measures which are provided in the "Model Summary" table. These measures are questionable and are typically not reported in the literature. Menard addresses these issues as follows: "Its utility in logistic regression has been questioned because, unlike R^2 and Aldrich and Nelson's pseudo- R^2, it is not based on the criteria used to select the model parameters. Also, if the dichotomous dependent variable is assumed to be an indicator for an unmeasured latent variable, R^2 provides a biased estimate of the explained variance." (Menard, 2002: 26) Based on these issues an R^2 will not be reported for this study.

Experimental Design Survey Data

Survey responses were sorted by Career Group (Operations, Support, Logistics, Acquisitions, and Special Investigations), Deployment Type (Individual Deployer, Unit Deployer, Both Deployer, Non-Deployer), Gender (Male, Female), Marital Status (Married, Not Married, Seperated/Divorced), Paygrade (2^{nd} Lieutenant, 1^{st} Lieutenant, Captain) and Commissioning Source (Academy, ROTC, OTS/ANGA/Other). T-Tests

were then conducted to analyze mean responses between separate samples within the groups identified in the previous sentence. Results are then compared and contrasted to the results of the Logistic Regression.

Statistical Analysis t-test

For this study t-tests were conducted to determine if there was a statistically significant difference between the mean survey responses. Two sided t-tests are used for this analysis and the Levene Statistic in SPSS is utilized to determine whether variances are assumed to be equal or unequal. However we assume that we do not know the population standard deviation, therefore the sampling distribution will be approximated by the Student's t distribution rather than the normal curve. The sample variances, test statistic, and degrees of freedom are computed as follows (Kanji, 2006: 33):

$$s_1^2 = \frac{\sum_{i=1}^{n_1}(x_i - \bar{x}_1)^2}{n_1 - 1}$$

$$s_2^2 = \frac{\sum_{i=1}^{n_2}(x_i - \bar{x}_2)^2}{n_2 - 1}$$

The test statistic is:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\left(\frac{s_1^2}{n_1} + \frac{s_1^2}{n_2}\right)^{\frac{1}{2}}}$$

Student's t-distribution with degress of freedom given by:

$$v = \left\{ \frac{\left\{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right\}^2}{\frac{s_1^4}{n_1^2(n_1 - 1)} + \frac{s_2^4}{n_2^2(n_2 - 1)}} \right\}$$

SPSS will be utilized to conduct the t-tests to determine if there is a statistically significant difference between the means of the samples from the survey data. When conducting a t-test in SPSS Levene's test is conducted to determine whether variances can be assumed to be equal or unequal. Levene's test tests the null hypothesis "that the variances in different groups are equal. It's a very simple and elegant test that works by doing a one-way ANOVA conducted on deviation scores." (Field 2009: 150) If the p value for the test statistic is less than or equal to 0.05 it can be assumed that variances are significantly different, if not then the variances are assumed to be equal for the test. (Field, 2009: 340) SPSS provides output for both assumed equal and assumed unequal variance, the results of Levene's test determine which line of analysis you interpret.

t-test Assumptions

Assumptions for a t-test assume that the sampling distribution is normally distributed and that the data are measured at least on the interval level. Also, assumptions for independent t-tests include that variances in the population are roughly equal and that scores are independent. (Field, 2009: 326) For the statistical analysis in this study a minimum sample size of thirty was observed to address the assumption of normality. Sample sizes below thirty are noted in the results section and the results for those tests are discounted. The data measured in the survey data consisted of five item Likert type scales for each separate question. Levene's test from SPSS will be observed to determine if variances are equal or unequal for the purposes of this analysis. Finally the survey scores for this analysis are all independent, every response is from a separate respondent.

Type I, Type II Errors

A Type I error is defined as rejecting a null hypothesis that is in fact true. A Type II error is defined as failing to reject a null hypothesis when it is false. (Leabo, 1972: 246) Utilizing a strict level of significance, such as a 0.01 alpha level, can reduce the chances of a Type I error yet increase the chances of a Type two error. Utilization of an alpha level of 0.05 reduces the chances of conducting a Type II error but increases the chances of having a type I error. Laebo states "The only way to reduce the probability of both kinds of errors is to increase the sample size." (Laebo, 1972: 249), however the sample size for this study is limited to the available data. The logistical regression analysis for this study has a larger sample size and utilizes an alpha of 0.05 or 95% confidence interval. Due to the smaller sample size present in the survey data an independent sample t-test is utilized with an alpha of 0.1 or a 90% confidence level. Use of a higher power can reduce the chances of a Type I error, however we acknowledge that the chances for a Type II error cannot be fully mediated.

Survey Questions and Scales

Satisfaction and Retention Intention are measured in the Status of Forces Surveys Fiscal year 2003 to 2009 through eight questions which are provided below.

The question: "Taking all things into consideration, how satisfied are you, in general with each of the following aspects of being in the military?" (Status of Forces Surveys 2003-2009), consists of five questions discussed below:

"Your total compensation, The Type of work you do in the military job, Your opportunities for promotion, The quality of your coworkers, and The quality of your

supervision" (Status of Forces Surveys 2003-2009) consist of five item Likert scales with responses ranging from "Very satisfied" being a five to "Very dissatisfied" being a one. A separate average will be made for each question.

Satisfaction and Retention intention is also measured through the "Overall, how satisfied are you with the military way of life?" (Status of Forces Surveys, 2003-2009) which consists of a five item Likert scale ranging from "Very satisfied" being a five to "Very dissatisfied" being a one.

The next question looks at retention intention and is stated as "Suppose that you have to decide whether to stay on active duty. Assuming you could stay, how likely is it that you would choose to do so?" (Status of Forces Surveys 2003-2009) which consists of a Likert type scale ranging from "Very Likely" being a five to "Very Unlikely" being a one.

Retention intention is explored through member perceptions of what their spouse and family think in the next two questions. The first question "Does your spouse or significant other think you should stay on or leave active duty?" (Status of Forces Survey 2003-2009) consists of a five item Likert type scale ranging from "Strongly favors staying" being a five to "Strongly favors leaving" being a one. Finally the last question analyzed is stated as "Does your family think you should stay on or leave active duty?" (Status of Forces Survey 2003-2009) and consists of a five item Likert type scale ranging from "Strongly favors staying" being a five to "Strongly favors leaving" being a one.

Comparisons of mean responses will be conducted between the following groups shown in the table on the following page.

Table 10: Survey Response Comparisons

Category	Comparisons
Career Group	Operations versus all other career groups
	Support versus all other career groups
	Logistics versus all other career groups
	Acquisitions, excluded due to sample size of 25
	Special ivestigations, excluded due to sample size of 5
Deployment Type	Individual Deployer versus all other deployment types
	Unit Deployer versus all other deployment types
	Both Deployer versus all other deployment types
	Non deployer, excluded due to sample size of 7
Gender	Male versus Female
Marital Status	Married versus all other marital categories
	Not married versus all other marital categories
	Seperated (Divorced), excluded due to sampel size of 13
Commissioning Source	Academy versus all other sources
	ROTC versus all other sources
	OTS, ANGA, Other versus all other sources
Pay Grade	1st Lieutenant versus all others
	Captain versus all others

Statistical Software

Two software packages were used to process the data and perform the statistical analysis. Microsoft Excel was utilized for data organization, cleaning, and coding. After the data was coded in Excel it was migrated into SPSS to perform the logistic regression modeling and t-tests. Once the models were developed they were evaluated using SPSS and Microsoft Excel.

Research Questions and Hypothesis

This section briefly lists the research questions and hypothesis formed for the logistic regression analysis and subsequent survey data analysis.

Logistic regression model Research Questions:

Deployment Type

1. Do the odds of retention for Air Force Junior Officers differ between deployment categories? (Individual, Unit, Both, and Non Deloyer)

H_0: There is no statistically significant difference in the odds of retention between Individual, Unit, Both, and Non Deployers.

H_A: There is a statistically significant difference in the odds of retention between Individual, Unit, Both, and Non Deployers.

Career Group

2. Is there a difference in the odds of retention for active duty junior officers based on Career Group, Gender, Marital Status, Deployment Type, Pay Grade, and Commissioning Source?

H_0: There is no difference in the odds of retention for personnel based on Career Group, Gender, Marital Status, Deployment Type, Rank, and Commissioning Source.

H_A: There is a difference in the odds of retention for personnel based on Career Group, Gender, Marital Status, Deployment Type, Rank, and Commissioning Source.

Male Deployers

3. Based on interaction variables, will the odds of retention be different for males across all deployment categories?

H_0: There is no difference in the odds of retention between male Individual Deployers, Unit Deployers, Both Deployers, and Non Deployers.

H_A: There a difference in the odds of retention between male Individual Deployers, Unit Deployers, Both Deployers, and Non Deployers.

Female Deployers

4. Based on interaction variables, will the odds of retention be different for females across all deployment categories?

H_0: There is no difference in the odds of retention between female Individual Deployers, Unit Deployers, Both Deployers, and Non Deployers.

H_A: There is a difference in the odds of retention between female Individual Deployers, Unit Deployers, Both Deployers, and Non Deployers.

Married Deployers

5. Based on interaction variables, will the odds of retention be different for married personnel across all deployment categories?

H_0: There is no difference in the odds of retention between married Individual Deployers, Unit Deployers, Both Deployers, and Non Deployers.

H_A: There is a difference in the odds of retention between married Individual Deployers, Unit Deployers, Both Deployers, and Non Deployers.

Males and Marital Status

6. Based on interaction variables, will the odds of retention be different for males based on marital status regardless of deployment category?

H_0: There is no difference in the odds of retention between males who are Married, Not Married, and Separated.

H_A: There is a difference in the odds of retention between males who are Married, Not Married, and Separated.

Females and Marital Status

7. Based on interaction variables, will the odds of retention be different for females based on marital status regardless of deployment category?

H_0: There is no difference in the odds of retention between females who are Married, Not Married, and Separated.

H_A: There is a difference in the odds of retention between females who are Married, Not Married, and Separated.

Logistics regression will be used to determine if there is a statistically significant difference in the odds of retention based on deployment group.

Survey Analysis Research Questions:

Deployment type:

1. Do mean survey responses differ between Individual Deployers and all others?

H_0: Mean survey responses for Individual Deployers will not differ from other deployment groups.

H_A: Mean survey responses for Individual Deployers will differ from other deployment groups.

2. Do mean survey responses differ between Unit Dpeloyers and all others?

H_0: Mean survey responses for Unit Deployers will not differ from other deployment groups.

H_A: Mean survey responses for Unit Deployers will differ from other deployment groups.

3. Do mean survey responses differ between Both Deployers and all others?

H_0: Mean survey responses for Both Deployers will not differ from other deployment.

H_A: Mean survey responses for Both Deployers will differ from other deployment groups.

4. Non Deployers are not tested due to a sample size of less than 30.

Career Group

1. Do mean survey responses differ between personnel in the Operations career group versus other career groups?

H_0: Mean survey responses for personnel in the Operations career group will not differ from other career groups.

H_A: Mean survey responses for personnel in the Operations career group will differ from other career groups.

2. Do mean survey responses differ between personnel in the Logistics career group versus others career groups?

H_0: Mean survey responses for personnel in the Logistics career group will not differ from other career groups.

H_A: Mean survey responses for personnel in the Logistics career group will differ from other career groups.

3. Do mean survey responses differ between personnel in the Support career group versus others career groups?

H_0: Mean survey responses for personnel in the Support career group will not differ from other career groups.

H_A: Mean survey responses for personnel in the Support career group will differ from other career groups.

4. Hypothesis testing for personnel in the Acquisitions and Special investigations career groups are not tested due to each career group having a sample size less than 30.

Gender

1. Do mean survey responses differ between males and females?

H_0: Mean survey responses for men will not differ from women.

H_A: Mean survey responses for men will differ from women.

Marital Status

1. Do mean survey responses differ between personnel who are married versus all others?

H_0: Mean survey responses for personnel who are Married will not differ from personnel who are Not Married or are Separated.

H_A: Mean survey responses for personnel who are Married will differ from personnel who are Not Married or are Separated.

2. Do mean survey responses differ between personnel who are Not Married versus all others?

H_0: Mean survey responses for personnel who are Not Married will not differ from personnel who are Married or are Separated.

H_A: Mean survey responses for personnel who are Not Married will differ from personnel who are Married or are Separated.

Commissioning Source

1. Do mean survey responses differ between personnel who commission through the Air Force Academy versus other commissioning sources?

H_0: Mean survey responses for personnel who commission through the Air Force Academy will not differ from personnel who commissioned through other sources.

H_A: Mean survey responses for personnel who commission through the Air Force Academy will differ from personnel who commissioned through other sources.

2. Do mean survey responses differ between personnel who commission through ROTC versus other commissioning sources?

H_0: Mean survey responses for personnel who commission through ROTC will not differ from personnel who commissioned through other sources.

H_A: Mean survey responses for personnel who commission through ROTC will differ from personnel who commissioned through other sources.

3. Do mean survey responses differ between personnel who commission through OTS, ANGA, and Other versus other commissioning sources?

H_0: Mean survey responses for personnel who commission through OTS, ANGA, and Other will not differ from personnel who commissioned through other sources.

H_A: Mean survey responses for personnel who commission through OTS, ANGA, and Other will differ from personnel who commissioned through other sources.

Pay Grade

1. Do mean survey responses differ between personnel with the pay grade of Captain versus others?

H_0: Mean survey responses for personnel with the pay grade of Captain will not differ from others.

H_A: Mean survey responses for personnel with the pay grade of Captain will differ from others.

2. Do mean survey responses differ between personnel with the pay grade of Captain versus others?

H_0: Mean survey responses for personnel with the pay grade of 1st Lieutenant will not differ from others.

H_A: Mean survey responses for personnel with the pay grade of 1st Lieutenant will differ from others.

3. 2nd Lieutenants are not tested due to a sample size of less than 30.

Chapter Summary

This chapter presented the research design and statistical models used to address the research questions. Independent and dependent variables were chosen based on both theoretical design and methodological considerations. The DMDC data used in this study was obtained from Ahner, Heilmann, and Paron's "Individual Deployer Study". Limitations and assumptions were discussed as well as the theoretical models for this research. The method of statistical evaluation used in this study is a variant of linear regression called logistic regression. Logistics regression has been used in social research to capture discrete or qualitative events and has been proven to be a useful tool for regression analysis of a dichotomous dependent variable. The analysis provides the logged odds of an event occurring which can mathematically be computed into either odds or probabilities for interpretation. A t-test was used to compare mean survey responses based upon responses drawn from our sample utilized in the logistic regression analysis. The results will be compared and contrasted with the results of the logistic regression. Finally research questions and hypothesis were presented.

IV. Analysis and Results

Chapter Overview

This chapter briefly discusses the findings and results of hypothesis testing using logistic regression analysis followed by hypothesis testing using T-tests for mean survey response. Hypothesis testing of twelve logistics regression models is conducted and statistically significant results are discussed. The first model explores the effects of deployments on retention. The second model incorporates additional variables such as marital status and gender. A parsimonious model is then presented based on the results of research question 2. The last five models utilize interaction variables to gain further insights into the data set. Strengths and weaknesses of each model are discussed. The results of the t-tests are then provided for survey responses. Finally a conclusion is provided.

Research Question 1: Deployment Type

Do the odds of retention for Air Force Junior Officers differ between deployment categories? (Individual, Unit, Both, and Non Deloyer)

H_0: There is no statistically significant difference in the odds of retention for personnel based on deployment category.

H_A: There is a statistically significant difference in the odds of retention for personnel based on deployment category.

In order to address this research question a model was run comparing Unit, Individual, and Both Deployers to Non deployers.

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = Non\ Deployer\ b0\ + Unit\ Deployer \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

$$+Individual\ Deployer \begin{bmatrix} 0 \\ 1 \end{bmatrix} + Both\ Deployer \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Figure 3: Effects of Deployments on Retention Model

A hypothesis test is initially performed using the Model Chi-square statistic to determine whether the independent variables provide statistically significant explanatory power for our model.

H_0: The model containing only the constant is sufficient.

H_A: The model with additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 9.488 with an alpha of 0.05 and 4 degrees of freedom.

Table 11: Model 1 Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	5.497	4	0.139
Model Summary			
-2 LL			
3059.206			

For initial model the W test statistic is 5.497 which is less than the test statistic 9.488, therefore we fail to reject the null hypothesis. This leads us to believe that the model with the independent variables does not have greater explanatory power.

Results for Research Question 1

Based on the results of this analysis we fail to reject the null hypothesis that there is no statistically significant difference in the odds of retention for junior officers based on deployment category. This finding is not supported by Fricker's (2002), Hosek and Totten's (2002), Paissant's (2008), Hosek and Martorell's (2009), and Alankaya and Kilic's (2009) findings that demonstrated a positive association between deployments and retention. However, Hall (2009) determined in his retention analysis that deployments did not significantly effect retention for Army Dentists. It is possible that with the Global War on Terror, deployments have become the norm rather than the exception for junior officers in the Air Force. In other words, other variables rather than deployments will effect the odds of retention.

Research Question 2: Career Groups

Is there a difference in the odds of retention for active duty junior officers based on Career Group, Gender, Marital Status, Deployment Type, Rank, and Commissioning Source?

H_0: There is no difference in the odds of retention for personnel based on Career Group, Gender, Marital Status, Deployment Type, Rank, and Commissioning Source.

H_A: There is a difference in the odds of retention for personnel based on Career Group, Gender, Marital Status, Deployment Type, Rank, and Commissioning Source.

To test the hypothesis five models were run, one for each Career Group, and their results compared to determine what variables affect retention.

Operations

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Male\begin{bmatrix}0\\1\end{bmatrix} + Married\begin{bmatrix}0\\1\end{bmatrix} + Individual\ Deployer\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ Unit\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Both\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Not\ Married\begin{bmatrix}0\\1\end{bmatrix} + Operations\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ 1st\ Lieutenant\begin{bmatrix}0\\1\end{bmatrix} + Captain\begin{bmatrix}0\\1\end{bmatrix} + Military\ Academy\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 4: Operations Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 19.675 with an alpha of 0.05 and 11 degrees of freedom.

Table 12: Operations Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	69.807	11	< 0.001
Model Summary			
-2 LL			
2994.896			

For this model the W test statistic is 69.807 which is greater than the test statistic 19.675, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 7 degrees of freedom on the following table:

Table 13: Operations Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
10.106	7	0.183

The p-value of 0.183 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Based upon the table on the following page Male, Married, and ROTC were significant at the $P < 0.05$ level.

Table 14: Summary of Results: Operations

	Exp(B)	Sig	Wald
Male	1.521	0.001	11.472
Married	1.845	0.004	8.238
Not Married	1.09	0.697	0.152
Operations	1.147	0.156	2.009
Individual Deployer	0.365	0.199	1.647
Unit Deployer	0.384	0.223	1.484
Both Deployer	0.457	0.32	0.988
1 LT	1.129	0.731	0.118
Capt	0.941	0.857	0.032
Military Academy	0.923	0.533	0.388
ROTC	0.734	0.012	6.376

Being a part of the Operations Career group does not affect the odds of retention significantly, however some variables are significant. Males, Individuals who are married, and personnel who commissioned through ROTC do show a change in the odds of retention. The odds of retention for personnel who are male are 1.521, therefore the odds of being retained are 52% higher for males which is significant at the $P < 0.001$ level.

Marriage also demonstrates a positive relationship with retention; the odds of retention for married officers are 1.845. The odds of being retained are 84.5% higher for married personnel versus all others and is significant at the $p < 0.01$ level. Finally the commissioning source ROTC demonstrates a negative effect upon retention. The odds of retention for ROTC graduates are 0.734 or 26.6% lower versus other commissioning sources. This result is significant at the $p < 0.05$ level.

Support

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Male\begin{bmatrix}0\\1\end{bmatrix} + Married\begin{bmatrix}0\\1\end{bmatrix} + Individual\ Deployer\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ Unit\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Both\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Not\ Married\begin{bmatrix}0\\1\end{bmatrix} + Support\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ 1st\ Lieutenant\begin{bmatrix}0\\1\end{bmatrix} + Captain\begin{bmatrix}0\\1\end{bmatrix} + Military\ Academy\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 5: Support Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 19.675 with an alpha of 0.05 and 11 degrees of freedom.

Table 15: Support Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	78.302	11	< 0.001
Model Summary			
-2 LL			
2986.401			

For this model the W test statistic is 78.302 which is greater than the test statistic 19.675, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 7 degrees of freedom on the following table:

Table 16: Support Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
11.682	7	0.111

The p-value of 0.111 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. The results are provided on the table below:

Table 17: Summary of Results: Support

	Exp(B)	Sig	Wald
Male	1.513	0.001	11.177
Married	1.85	0.004	8.255
Support	0.701	0.001	10.631
Not Married	1.088	0.704	0.144
Individual Deployer	0.321	0.15	2.073
Unit Deployer	0.331	0.161	1.963
Both Deployer	0.397	0.242	1.367
1 LT	1.14	0.71	0.138
Capt	0.933	0.835	0.043
Military Academy	0.905	0.435	0.61
ROTC	0.721	0.008	7.091

Personnel in the Support career field show a decrease in the odds of retention, 0.701 which is significant at the $p < 0.01$ level. The odds of retention for personnel in the support career field are 29.9% lower versus all others. The variables Male, Married, and

ROTC are again significant. The odds of retention for Males, 1.513, are significant at the $p < 0.001$ level, and are 51.3% times higher versus females. The odds of being retained for married personnel are 1.85, or 85% higher than personnel who are not married or are separated. This finding is significant at the $p < 0.01$ level. Finally the commissioning source ROTC demonstrates a negative effect upon retention. The odds of retention for personnel who commission through ROTC are 0.721, or 27.9% lower than other commissioning sources, this finding is significant at the $p < 0.01$ level.

Logistics

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Male\begin{bmatrix}0\\1\end{bmatrix} + Married\begin{bmatrix}0\\1\end{bmatrix} + Individual\ Deployer\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ Unit\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Both\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Not\ Married\begin{bmatrix}0\\1\end{bmatrix} + Logistics\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ 1st\ Lieutenant\begin{bmatrix}0\\1\end{bmatrix} + Captain\begin{bmatrix}0\\1\end{bmatrix} + Military\ Academy\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 6: Logistics Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 19.675 with an alpha of 0.05 and 11 degrees of freedom.

Table 18: Logistics Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	76.224	11	< 0.001
Model Summary			
-2 LL			
2988.479			

For this model the W test statistic is 76.224 which is greater than the test statistic 19.675, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is conducted next to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 8 degrees of freedom on the following table:

Table 19: Logistics Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
11.682	8	0.224

The p-value of 0.224 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Results are provided on the table below:

Table 20: Summary of Results: Logistics

	Exp(B)	Sig	Wald
Male	1.582	0.001	13.673
Married	1.855	0.004	8.349
Logistics	1.575	0.005	7.979
Not Married	1.098	0.674	0.178
Individual Deployer	0.389	0.231	1.432
Unit Deployer	0.424	0.276	1.187
Both Deployer	0.506	0.388	0.745
1 LT	1.244	0.537	0.382
Capt	1.076	0.829	0.047
Military Academy	0.981	0.822	0.022
ROTC	0.748	0.018	5.621

Personnel in the Logistics career group show an increase in the odds of retention, 1.575 which is significant at the $p < 0.01$ level. Thus the odds of retention for personnel in the Logistics career group are 57.5% higher compared to other career fields. Other variables of interest that prove to be statistically significant are Male, Married and ROTC. Male is significant at the $p < 0.001$ level and the odds of retention are 1.582, or 58.2% higher than females. Marriage once again demonstrates a positive effect upon retention and is significant at the 0.01 level. The odds of being retained if an individual is married are 1.85, 85% times higher than personnel who are not married or separated. Finally the commissioning source ROTC demonstrates a negative effect upon retention. The odds of retention for personnel who commission through ROTC are 0.748, 25.2% lower than other commissioning sources and is significant at the $p < 0.05$ level.

Acquisitions

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Male\begin{bmatrix}0\\1\end{bmatrix} + Married\begin{bmatrix}0\\1\end{bmatrix} + Individual\ Deployer\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ Unit\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Both\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Not\ Married\begin{bmatrix}0\\1\end{bmatrix} + Acquisitions\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ 1st\ Lieutenant\begin{bmatrix}0\\1\end{bmatrix} + Captain\begin{bmatrix}0\\1\end{bmatrix} + Military\ Academy\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 7: Acquisitions Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 19.675 with an alpha of 0.05 and 11 degrees of freedom.

Table 21: Acquisitions Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	67.812	11	< 0.001
Model Summary			
-2 LL			
2996.891			

For this model the W test statistic is 67.812 which is greater than the test statistic 19.675 at the $p < 0.001$ level. Therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 8 degrees of freedom on the following table:

Table 22: Logistics Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
14.505	7	0.043

The p-value of 0.043 is less than 0.05 which demonstrates that our model fails to fit across a range of probabilities. Results for this model are reported below however their generalizability is questionable.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Results are provided on the table below:

Table 23: Summary of Results: Acquisitions

	Exp(B)	Sig	Wald
Male	1.546	0.001	12.47
Married	1.855	0.004	8.387
Acquisitions	0.983	0.926	0.009
Not Married	1.098	0.674	0.177
Individual Deployer	0.387	0.227	1.457
Unit Deployer	0.418	0.266	1.237
Both Deployer	0.499	0.377	0.781
1 LT	1.162	0.67	0.182
Capt	0.993	0.982	0
Military Academy	0.955	0.714	0.134
ROTC	0.745	0.016	5.834

The results for the odds of retention for personnel in the Acquisitions Career field are not statistically significant. Other variables such are Male, Married, and ROTC are

significant and their results are similar to the other models and do not offer much insight. The odds of being retained for males is 55% higher versus females and is significant at the $p < 0.001$ level. The odds of retention for married personnel are 85.5% higher versus others and is significant at the $p < 0.01$ level. Finally, the odds of retention for personnel who commission through ROTC are 24.5% lower than other commissioning sources, this finding is significant at the $p < 0.05$ level.

Special Investigations

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Male\begin{bmatrix}0\\1\end{bmatrix} + Married\begin{bmatrix}0\\1\end{bmatrix} + Individual\ Deployer\begin{bmatrix}0\\1\end{bmatrix}$$
$$+ Unit\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Both\ Deployer\begin{bmatrix}0\\1\end{bmatrix} + Not\ Married\begin{bmatrix}0\\1\end{bmatrix}$$
$$+Special\ Investigations\begin{bmatrix}0\\1\end{bmatrix} + 1st\ Lieutenant\begin{bmatrix}0\\1\end{bmatrix} + Captain\begin{bmatrix}0\\1\end{bmatrix}$$
$$+Military\ Academy\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 8: Special Investigations Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 19.675 with an alpha of 0.05 and 11 degrees of freedom.

Table 24: Special Investigations Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	70.218	11	< 0.001
Model Summary			
-2 LL			
2944.485			

For this model the W test statistic is 70.218 which is greater than the test statistic 19.675, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 7 degrees of freedom on the following table:

Table 25: Special Investigations Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
13.087	7	0.07

The p-value of 0.07 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Based upon the table below Male, Married, and ROTC were significant at the $P < 0.05$ level. None of the other variables were found to be statistically significant.

Table 26: Summary of Results: Special Investigations

	Exp(B)	Sig	Wald
Male	1.55	0	12.603
Married	1.856	0.004	8.408
Special Inv	0.526	0.116	2.471
Not Married	1.103	0.659	0.194
Individual Deployer	0.387	0.226	1.463
Unit Deployer	0.422	0.271	1.214
Both Deployer	0.503	0.381	0.766
1 LT	1.173	0.65	0.205
Capt	1.001	0.999	0
Military Academy	0.952	0.699	0.15
ROTC	0.745	0.016	5.816

Being a part of the Special Investigations Career group does not provide a statistically significant result when determining the odds of retention. Males show an increase in the odds of retention, the odds of retention for males are 55% higher versus females and is significant at the $p < 0.001$ level. The odds of retention for married personnel are higher than personnel who are not married or separated. The odds of retention are 85.6% higher for married personnel versus others and is significant at the $p < 0.01$ level. Finally personnel who commission through ROTC demonstrate lower odds of retention versus other commissioning groups. The odds of being retained for ROTC graduates are 26.6% lower versus Academy and OTS/other graduates. This result is significant at the $p < 0.05$ level.

Results for Research Question 2

Based on the five separate tests our hypothesis is partially supported. Personnel in the Logistics career group demonstrated higher odds of retention, 57.5% increase, versus all others. Personnel in the Support career group demonstrated lower odds of retention, 38.9% decrease, versus all others. Alankaya and Kilic (2009) did find a

difference in the odds of retention between career groups in the U.S. Navy. However, Fricker (2002) discovered that there were relatively few differences in retention between occupational categories. AFPC (2011) provides a report on their website which shows that the Civil Engineering and Public Affairs career fields are stressed for personnel, both career fields fall into the Support career group. This report does support our finding that personnel in the Support career group demonstrate lower odds of retention.

Males demonstrated higher odds of retention versus females in all of the models. The values ranged from a 51% to a 58% increase in the odds of retention for males versus females, however all of the models indicated higher odds of retention for males versus females. This finding is supported by Fricker's (2002) study in which he found that that the Air Force had higher separation rates for female junior officers compared the male junior officers. Alankaya and Kilic (2009) also determined that female officers in the U.S. Navy had higher separation rates versus male officers. Hall's (2009) thesis however does not support this finding, he determine that gender did not have a significant effect on retention for active duty Army dentists.

Personnel who were married demonstrated higher odds of retention versus personnel who were not married or separated in all of the models. The values from the models ranged from a 84% to an 85% increase in the odds of retention for married personnel versus all others. This finding is supported by Chow and Polich (1980) who discovered that personnel with dependents had higher enlistment rates versus personnel who did not have dependents. Hosek and Totten (2002) determined that reenlistment was higher for personnel with dependents compared to those without dependents. Moore (2002) revealed that marital status was a significant variable of interest for explaining

who will remain in the military. Fricker (2002) found that regardless of rank or service, personnel with families were more likely to remain on active duty versus personnel without families. Hall (2009) also determined that the odds of leaving the military for married officers were lower than single officers. Celik and Karakaya (2011) discovered that officers, who were male, married, and who had children were more likely to stay in the military versus female, single, without child officers. Cerman (2005) revealed that personnel who were married had a higher probability of being retained versus single personnel.

ROTC graduates demonstrated lower odds of retention versus other commissioning groups. The values ranged from a 25.2% to a 27.9% decrease in the odds of retention for personnel who commission through ROTC versus all others, all of the models show a decrease in the odds of retention for ROTC graduates versus all others. Hall (2009) determined that personnel who commission through ROTC demonstrate lower odds of retention compared to Military Academy graduates. Karakaya and Celik (2011) determined that the odds of retention were higher for Military Academy graduates versus other commissioning sources for Naval Officers.

Pay grade (rank) and other variables did not provide statistically significant results for this analysis. This finding does not compliment previous studies. Boesel and Johnson (1984) determined that pecuniary variables were significant determinants of reenlistment. Hosek, Kavanagh, and Miller (2006) also determine that pay has a significant effect on retention. Pay itself may have a significant effect on retention between other ranks (enlisted versus officer) however when comparing only junior officers it does not have a significant effect on the odds of retention.

Parsimonious model

Based on the results of research question 2, a parsimonious model was created and is presented below:

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Male\begin{bmatrix}0\\1\end{bmatrix} + Married\begin{bmatrix}0\\1\end{bmatrix} + Support\begin{bmatrix}0\\1\end{bmatrix}$$

$$+ Logistics\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 9: Parsimonious Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 11.071 with an alpha of 0.05 and 5 degrees of freedom.

Table 27: Parsimonious Model Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	75.571	6	< 0.001
Model Summary			
-2 LL			
2989.132			

For this model the W test statistic is 75.571 which is greater than the test statistic 11.071, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 7 degrees of freedom on the following table:

Table 28: Parsimonious Model Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
8.815	7	0.266

The p-value of 0.266 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Based upon the table below all of the independent variables are significant at the $P < 0.05$ level.

Table 29: Summary of Results: Parsimonious Model

	Exp(B)	Sig	Wald
Male	1.535	0.001	12.056
Married	1.68	0	30.944
Support	0.762	0.011	6.52
Logistics	1.463	0.019	5.535
ROTC	0.774	0.004	8.183

Results for Parsimonious Model

The odds of retention for males are 53.5% higher compared to females, this is significant at the $p < 0.001$ level. This finding is supported by Fricker's (2002) study in which he found that that the Air Force had higher separation rates for female junior officers compared the male junior officers. Alankaya and Kilic (2009) also determined that female officers in the U.S. Navy had higher separation rates versus male officers. Hall's (2009) thesis however does not support this finding, he determine that gender did not have a significant effect on retention for active duty Army dentists.

Married personnel have an odds of retention that are 68% higher than personnel who are not married or separated, this is significant at the $p < 0.001$ level. This finding is supported by Chow and Polich (1980) who discovered that personnel with dependents had higher enlistment rates versus personnel who did not have dependents. Hosek and Totten (2002) determined that reenlistment was higher for personnel with dependents compared to those without dependents. Moore (2002) revealed that marital status was a significant variable of interest for explaining who will remain in the military. Fricker (2002) found that regardless of rank or service, personnel with families were more likely to remain on active duty versus personnel without families. Hall (2009) also determined that the odds of leaving the military for married officers were lower than single officers.

Celik and Karakaya (2011) discovered that officers, who were male, married, and who had children were more likely to stay in the military versus female, single, without child officers. Cerman (2005) revealed that personnel who were married had a higher probability of being retained versus single personnel.

Personnel in the Support career group have a lower odds of retention compared to other Career groups. The odds of retention for Support are 23.8% lower than other career groups at the $p < 0.05$ level of significance. The odds of retention for junior officers in the Logistics Career group are 46.3% higher compared to others and this finding is significant at the $p < 0.05$ level. Alankaya and Kilic (2009) found a difference in the odds of retention between career groups in the U.S. Navy. However, Fricker (2002) discovered that there were relatively few differences in retention between occupational categories. AFPC (2011) provides a report on their website which shows that the Civil Engineering and Public Affairs career fields are stressed for personnel, both career fields fall into the Support career group. This report does support our finding that personnel in the Support career group demonstrate lower odds of retention.

Finally, junior officers who commission through ROTC demonstrate a decrease in the odds of retention. The odds of retention for ROTC graduates are 22.6% lower compared to others, this is significant at the $p < 0.01$ level. Hall (2009) determined that personnel who commission through ROTC demonstrate lower odds of retention compared to Military Academy graduates. Karakay and Celik (2011) determined that the odds of retention were higher for Military Academy graduates versus other commissioning sources for Naval Officers.

Interaction Variables

Research Question 3: Male Deployers

Based on interaction variables, will the odds of retention be different for males across all deployment categories?

H_0: There is no difference in the odds of retention between male individual deployers, unit deployers, both deployers, and non deployers.

H_A: There a difference in the odds of retention between male individual deployers, unit deployers, both deployers, and non deployers.

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Male\ Individual\ Deployers \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

$$+Male\ Unit\ Deployers \begin{bmatrix} 0 \\ 1 \end{bmatrix} + Male\ Both\ Deployers \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

$$+ Male\ Non\ Deployers \begin{bmatrix} 0 \\ 1 \end{bmatrix} + Married \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

$$+Logistics \begin{bmatrix} 0 \\ 1 \end{bmatrix} + Support \begin{bmatrix} 0 \\ 1 \end{bmatrix} + ROTC \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Figure 10: Male Deployer Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 15.507 with an alpha of 0.05 and 8 degrees of freedom.

Table 30: Male Deployers Model Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	80.869	8	< 0.001
Model Summary			
-2 LL			
2983.834			

For this model the W test statistic is 80.869 which is greater than the test statistic 15.507, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 5 degrees of freedom on the following table:

Table 31: Male Deployers Model Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
11.706	8	0.165

The p-value of 0.165 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Based upon the table below seven independent variables are significant at the $P < 0.05$ level.

Table 32: Summary of Results: Male Deployers Model

Male*	Exp(B)	Sig	Wald
Individual Deployer*	1.465	0.01	6.62
Unit Deployer*	1.455	0.005	7.917
Both Deployer*	1.741	0.001	13.756
Non Deployer*	6.486	0.078	3.112
Married	1.679	0.001	30.712
Logistics	1.45	0.022	5.525
Support	0.752	0.009	6.868
ROTC	0.772	0.004	8.305

Results for Research Question 3

The odds of retention for male individual deployers are 46.5% higher compared to all others, this is significant at the $p < 0.01$ level. The odds of retention for male unit deployers are 45.5% higher than all others and is significant at the $p < 0.001$ level of significance. Male Both deployers also demonstrate an increase in the odds of retention which are 74.1% higher versus all others and is significant at the $p < 0.001$ level. Male Non Deployers demonstrate an increase in the odds of retention which are 548% higher versus all others and is significant at the $p < 0.01$ level however this finding is erroneous. The Standard Error for Male Non-Deployers was higher than the other categories, not only that but the sample size of 13 was not adequate for the model. The rule of thumb regarding sample sizes for Logistics regression is 10 samples per individual variable and was discussed in the methodology section. Based on this rule of thumb a sample size of roughly 80 would be expected for Male Non Deployers, unfortunately the sample size of Male Non Deployers was only 13. Based on the error in the results this model's results will not be reported and we fail to reject the null hypothesis that the odds of retention will differ between male Individual, Both, Unit, and Non Deployers.

Research Question 4: Female Deployers

Based on interaction variables, will the odds of retention be different for females across all deployment categories?

H_0: There is no difference in the odds of retention between female individual deployers, unit deployers, both deployers, and non deployers.

Ha: There a difference in the odds of retention between female individual deployers, unit deployers, both deployers, and non deployers.

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Female\ Individual\ Deployers \begin{bmatrix}0\\1\end{bmatrix}$$

$$+Female\ Unit\ Deployers \begin{bmatrix}0\\1\end{bmatrix} + Female\ Both\ Deployers \begin{bmatrix}0\\1\end{bmatrix}$$

$$+Female\ Non\ Deployers \begin{bmatrix}0\\1\end{bmatrix} + Married \begin{bmatrix}0\\1\end{bmatrix}$$

$$+Logistics \begin{bmatrix}0\\1\end{bmatrix} + Support \begin{bmatrix}0\\1\end{bmatrix} + ROTC \begin{bmatrix}0\\1\end{bmatrix}$$

Figure 11: Female Deployer Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

Ha: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table on the following page, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 15.507 with an alpha of 0.05 and 8 degrees of freedom.

Table 33: Female Deployers Model Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	22.279	4	< 0.001
Model Summary			
-2 LL			
3042.424			

For this model the W test statistic is 22.279 which is greater than the test statistic 9.488, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 1 degree of freedom on the following table:

Table 34: Female Deployers Model Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
8.677	7	0.277

The p-value of 0.277 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Based upon the table below six independent variables are significant at the $P < 0.05$ level.

Table 35: Summary of Results: Female Deployers Model

Female*	Exp(B)	Sig	Wald
Individual Deployer*	0.537	0.002	9.448
Unit Deployer*	0.686	0.031	4.644
Both Deployer*	0.78	0.315	1.011
Non Deployer*	0.63	0.749	0.102
Married	1.688	0.001	31.45
Logistics	1.482	0.015	5.861
Support	0.769	0.014	6.034
ROTC	0.776	0.005	7.939

Results Research Question 4

The odds of retention for female individual deployers are 46.3% lower versus all others and is significant at the $p < 0.01$ level. The odds of retention for female Unit Deployers are 31.4% lower than all others and is significant at the $p < 0.05$ level. The results for female both deployers and non deployers are not statistically significant. Female Unit and Both deployers both demonstrate lower odds of retention versus all others. This finding is complimented by Fricker (2002) where he determined that the Air Force had higher separation rates for females versus males. Alankaya and Kilic (2009) also determined that female officers had lower odds of retention versus males. This finding also contradicts other studies, Fricker (2002), Fricker and Buttrey (2008), and Paissant (2008) all found a positive association between deployments and retention. However for female deployers are lower versus all others. The odds of retention for personnel that are married are 68.8% higher versus others which is significant at the $p <$

0.001 level. Personnel in the Logistics Career Group have odds of retention that are 48.2% higher versus other career groups which is significant at the $p < 0.05$ level. Personnel in the Support Career Group demonstrate odds of retention that are 23.1% lower versus other career groups. The odds of retention for personnel who commission through ROTC are 22.4% lower versus other commissioning sources which is significant at the $p < 0.01$ level. Based on these results our hypothesis is partially supported, the odds of retention for female individual and unit deloyers are statistically significant and show a decrease in the odds of retention versus others.

Research Question 5: Married Deployers

Based on interaction variables, will the odds of retention be different for married personnel across all deployment categories?

H_0: There is no difference in the odds of retention between married individual deployers, unit deployers, both deployers, and non deployers.

H_A: There is a difference in the odds of retention between married individual deployers, unit deployers, both deployers, and non deployers.

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Married\ Individual\ Deployers\begin{bmatrix}0\\1\end{bmatrix}$$

$$+Married\ Unit\ Deployers\begin{bmatrix}0\\1\end{bmatrix} + Married\ Both\ Deployers\begin{bmatrix}0\\1\end{bmatrix}$$

$$+Married\ Non\ Deployers\begin{bmatrix}0\\1\end{bmatrix} + Male\begin{bmatrix}0\\1\end{bmatrix} + Logistics\begin{bmatrix}0\\1\end{bmatrix}$$

$$+Support\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 12: Married Deployers Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 15.507 with an alpha of 0.05 and 8 degrees of freedom.

Table 36: Married Deployers Model Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	82.436	8	< 0.001
Model Summary			
-2 LL			
3064.703			

For this model the W test statistic is 82.436 which is greater than the test statistic 15.507, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 8 degrees of freedom on the following table:

Table 37: Married Deployers Model Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
9.588	8	0.295

The p-value of 0.295 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Based upon the table below all of the independent variables are significant at the $P < 0.05$ level.

Table 38: Summary of Results: Married Deployers Model

Married*	Exp(B)	Sig	Wald
Individual Deployer*	1.555	0.001	11.924
Unit Deployer*	1.592	0.001	18.183
Both Deployer*	2.002	0.001	25.027
Non Deployer*	8.158	0.046	3.977
Logistics	1.455	0.021	5.347
Support	0.757	0.01	6.604
Male	1.526	0.001	11.662
ROTC	0.775	0.005	8.05

Results Research Question 5

The odds of retention for personnel who are married and have been on an Individual deployment are 55.5% higher than all others and is significant at the $p < 0.001$ level. The odds of retention for Married Unit Deployers are 59.2% higher than others and is significant at the $p < 0.001$ level. Both Deployers have the highest odds of retention, the odds of retention for both deployers are 100.2% higher compared to other deployment categories and this finding is significant at the $p < 0.001$ level. Non-Deployers were statistically significant for this model, however the sample size was only 16 well below the recommended 50 and these results are not reliable. An increase of approximately 700% is not realistic and is an obvious error for this model. The Standard Error for Married Non-Deployers was higher than the other categories, not only that but

the sample size of 13 was not adequate for the model. The rule of thumb regarding sample sizes for Logistics regression is 10 samples per individual variable and was discussed in the methodology section. Based on this rule of thumb a sample size of roughly 80 would be expected for Married Non Deployers, unfortunately the sample size of Married Non Deployers was only 13. Based on the error in the results this model's results will not be reported and we fail to reject the null hypothesis that the odds of retention will differ between married Individual, Both, Unit, and Non Deployers.

Research Question 6: Males and Marital Status

Based on interaction variables, will the odds of retention be different for males regardless of marital status?

H_0: There is no difference in the odds of retention between males who are married, not married, or separated.

H_A: There is a difference in the odds of retention between males who are married, not married, or separated.

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 \ + Male\ Married\begin{bmatrix}0\\1\end{bmatrix} + Male\ Not\ Married\begin{bmatrix}0\\1\end{bmatrix}$$

$$+Male\ Seperated\begin{bmatrix}0\\1\end{bmatrix} + Logistics\begin{bmatrix}0\\1\end{bmatrix} + Support\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 13: Male Marital Status Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 12.591 with an alpha of 0.05 and 6 degrees of freedom.

Table 39: Males Marital Status Model Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	84.112	6	< 0.001
Model Summary			
-2 LL			
2980.591			

For this model the W test statistic is 84.112 which is greater than the test statistic 12.591, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 7 degrees of freedom on the following table:

Table 40: Males Marital Status Model Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
5.749	7	0.569

The p-value of 0.569 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Based upon the table below four variables are significant at the $p < 0.05$ level, the other variables are not significant.

Table 41: Summary of Results: Males Marital Status Model

Male*	Exp(B)	Sig	Wald
Married*	2.052	0.001	32.329
Not Married*	1.108	0.472	0.517
Seperated*	0.911	0.722	0.127
Logistics	1.476	0.016	5.787
Support	0.765	0.012	6.318
ROTC	0.775	0.005	8.002

Results Research Question 6

The odds of retention for males who are married are 105.2% higher than the other marital categories and the results are significant at the $p < 0.001$ level. The other two marital status independent variables do not provide statistically significant results. The odds of retention for personnel in the Logistics Career Group are 47.6% versus other career groups and is significant at the $p < 0.05$ level. The odds of retention for personnel in the Support Career Group are 33.5% lower versus other career groups and is significant at the $p < 0.05$ level. Finally ROTC graduates demonstrate odds of retention that are 32.5% lower versus other commissioning sources and is significant at the $p < 0.01$ level. The hypothesis is partially supported, males that are married demonstrate higher odds of retention versus all others; however the results for males that are not

married or separated are not statistically significant. The other findings for this model are consistent with the other models in this thesis.

Research Question 7: Females and Marital Status

Based on interaction variables, will the odds of retention be different for females regardless of marital status?

H_0: There is no difference in the odds of retention between females who are married, not married, or separated.

H_A: There is a difference in the odds of retention between females who are married, not married, or separated.

$$ln\left(\frac{P(Retained)}{(1-P(Retained))}\right) = b0 + Female\ Married\begin{bmatrix}0\\1\end{bmatrix} + Female\ Not\ Married\begin{bmatrix}0\\1\end{bmatrix}$$

$$+Female\ Seperated\begin{bmatrix}0\\1\end{bmatrix} + Logistics\begin{bmatrix}0\\1\end{bmatrix} + Support\begin{bmatrix}0\\1\end{bmatrix} + ROTC\begin{bmatrix}0\\1\end{bmatrix}$$

Figure 14: Female Marital Status Retention Model

A hypothesis test must be performed to determine if the model is statistically significant. The hypothesis test is:

H_0: The model containing only the constant is sufficient.

H_A: The model with the additional variables has more explanatory power than the model with only the constant.

Let W be the Model Chi-square Statistic from the table below, then the decision rule for this model is reject Ho if W is greater than or equal to a Chi Square statistic of 12.591 with an alpha of 0.05 and 6 degrees of freedom.

Table 42: Females Marital Status Model Chi-Square Summary

Model Chi-square Statistic			
	Chi-Square	df	p-value
Model	45.151	6	< 0.001
Model Summary			
-2 LL			
3019.552			

For this initial model the W test statistic is 45.151 which is greater than the test statistic 12.591, therefore we reject the null hypothesis. This leads us to believe that the model with the independent variables has greater explanatory power.

The Hosmer Lemeshow goodness-of-fit test is next conducted to determine whether our function fits across a range of probabilities and is generally considered significant if $p > 0.05$. SPSS provides the Chi-square statistic and significance at 6 degrees of freedom on the following table:

Table 43: Females Marital Status Model Hosmer and Lemeshow Summary

Hosmer and Lemeshow Test		
Chi-square	df	Sig
7.332	6	0.291

The p-value of 0.291 is greater than 0.05 which demonstrates that our model fits across a range of probabilities.

Finally the Wald statistic is utilized to test the statistical significance of individual coefficients for the model. Based upon the table below five of the independent variables are significant at the $p < 0.05$ level.

Table 44: Summary of Results: Female Marital Status Model

Female*	Exp(B)	Sig	Wald
Married*	0.582	0.001	11.428
Seperated*	0.704	0.378	0.778
Not Married*	0.594	0.005	8.055
Logistics	1.469	0.017	5.727
Support	0.769	0.013	6.162
ROTC	0.756	0.002	9.905

Results Research Question 7

Females who are married demonstrate a 41.8% decrease in the odds of retention which is significant at the $p < 0.001$ level. Females who are not married demonstrate a 40.6% decrease in the odds of retention and is significant at the $p < 0.01$ level of significance. The findings for females that are not married are questionable due to a small sample size. The results for females who are were separated/divorced are not statistically significant. This finding is supported by Fricker's (2002) study where he determined that Air Force female junior officers had higher separation rates versus male junior officers. Alankaya and Kilic (2009) also found that female officers had lower odds of retention versus male officers. The odds of retention for personnel in the Logistics career group are 46.9% higher versus other career groups and is significant at the $p < 0.05$ level. Personnel in the support career groups have odds of retention that are 23.1% lower versus other career groups and is significant at the $p < 0.05$ level. The odds of retention for personnel in the ROTC commissioning group demonstrate odds of retention that are 24.4% lower versus other commissioning sources, this result is significant at the $p < 0.01$ level. Based on these results the hypothesis is partially supported, females who are

married and not married demonstrate statistically significant differences in the odds of retention versus all others.

Analysis of Survey Results

Analysis of mean survey responses based on deployment type, career group, gender, marital status, commissioning source, and pay grade are conducted. The procedures used to discuss hypothesis testing are discussed in the following paragraph. The procedures used to conduct t-tests for mean survey results that are discussed apply to all t-tests conducted. Therefore the procedures are outlined once and results are provided for comparisons in the following paragraphs.

Procedures for survey analysis

T-tests were conducted through the use of SPSS to compare mean survey responses between groups of interest discussed in the logistic regression analysis. SPSS provides test results for both assumed equal and assumed unequal variances. Levene's test is initially conducted to determine whether or not we assume equal or unequal variances. If the p-value for the test is greater than 0.05 we fail to reject the null hypothesis and the results for equal variances are interpreted. If the null hypothesis is rejected the results for unequal variances are interpreted.

Next SPSS provides results for the t-test. A second hypothesis test is conducted to determine if the means are equal or significantly different.

H_0: There is no statistically significant difference between the two average survey responses.

H_A: There is a statistically significant difference between the two average survey responses.

If the t-statistic has a p value of less than 0.1 we reject the null hypothesis and determine that there is a statistically significant difference in average responses between the two groups that are being compared. If we fail to reject the null hypothesis then we are unable to determine if there is a significant difference between the two groups. Mean responses as well as the test statistic with degrees of freedom and p value are consolidated and reported in tables.

T-tests are conducted for the following questions, results will be provided in the same order. The only exception will be for comparison of survey responses based on marital status. Survey questions 4 and 5 will be excluded for these comparisons. All of the questions are drawn from the Status of Forces Surveys 2003-2009.

1. "Taking all things into consideration, how satisfied are you, in general with each of the following aspects of being in the military?"

    a. "Your total compensation"

    b. "The Type of work you do in the military job"

    c. "Your opportunities for promotion"

    d. "The quality of your coworkers"

    e. "The quality of your supervision"

2. “Overall, how satisfied are you with the military way of life?”

3. “Suppose that you have to decide whether to stay on active duty. Assuming you could stay, how likely is it that you would choose to do so?”

4. “Does your spouse or significant other think you should stay on or leave active duty?”

5. “Does your family think you should stay on or leave active duty?”

As stated earlier, this test is conducted for all survey comparisons. In the following sections the research question is provided followed by the results of the hypothesis tests for each comparison.

Deployment type

The following paragraphs present the hypothesis being tested followed by a description of the analysis and the results of the hypothesis test. Hypothesis testing was not conducted for Non-deployers due to a sample size that was less than 30. A table is provided at the end of each summary presenting all of the results for the t-tests.

Individual Deployers

H_0: Mean survey responses for Individual Deployers will not differ from other deployment groups.

H_A: Mean survey responses for Individual Deployers will differ from other deployment groups.

Individual Deployers do not differ significantly from others in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1c) opportunities for promotion, (2) overall satisfaction, (3) likeliness to stay in the military, and (5) whether

their family thinks they should remain. Individual Deployers differ from others, at the p is less than 0.1 level of significance, in perceptions of the (1d) quality of coworkers, (1e) quality of supervision, and whether their (4) spouse/significant other thinks they should stay on active duty. Individual Deployers have a lower average response, 3.73 versus 4.13, in perceptions of the quality of coworkers versus others. Individual Deployers differ from other deployment groups in perceptions of the quality of supervision with an average response of 3.73 which is lower than others with an average response of 4.1. Finally Individual Deployers differ in perceptions of whether their spouse/significant other thinks they should stay on duty, the average response for Individual Deployers is 3.89 which is higher than others at 3. All of these results are significant at the p is less than 0.1 level of significance. Based on these results our hypothesis is partially supported. Individual Deployers differ in mean survey responses from Unit and Both Deployers in perceptions of the quality of coworkers, the quality of supervisions, and whether their spouse/significant other thinks that they should stay on active duty. These findings do not complement the findings from the regression analysis since the logistic regression models did not provide significant results for deployment type. Full results of the analysis are presented in the table on the following page.

Table 45: Summary of Survey Results: Individual Deployers

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. ID	3.86	0.89	-0.67	303	0.51	Fail to reject
Other	3.94	0.83				
1b. ID	3.88	1.06	-0.63	125.34	0.53	Fail to reject
Other	3.96	0.93				
1c. ID	3.96	0.91	0.06	135.34	0.95	Fail to reject
Other	3.96	0.89				
1d. ID	3.85	0.92	-2.97	303	0.01	Reject
Other	4.13	0.8				
1e. ID	3.73	0.12	-2.97	303	0.01	Reject
Other	4.1	0.06				
2. ID	3.93	0.09	0.26	303	0.79	Fail to reject
Other	3.9	0.06				
3. ID	4.1	0.12	1.59	303	0.11	Fail to reject
Other	3.86	0.08				
4. ID	3.89	1.26	2.19	265	0.03	Reject
Other	3.5	1.29				
5. ID	3.64	1.31	1.09	124.98	0.28	Fail to reject
Other	3.46	1.12				

Unit Deployers

H_0: Mean survey responses for Unit Deployers will not differ from other deployment groups.

H_A: Mean survey responses for Unit Deployers will differ from other deployment groups.

Unit Deployers do not differ significantly from others in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1c) opportunities for promotion, (2) overall satisfaction, and (5) whether their family thinks they should remain. Unit Deployers do differ from others, at the p is less than 0.1 level of significance, in perceptions of the (1d) quality of coworkers, (1e) quality of supervision, (3) likeliness to stay in the military, and whether their (4) spouse/significant other thinks

they should stay on active duty. Unit Deployers have a higher average response, 4.15 versus 3.99, in perceptions of the quality of coworkers versus others. Unit Deployers differ from others in perceptions of the quality of supervision with an average response of 4.14 which is higher than others with an average response of 3.9. Finally Unit Deployers differ in perceptions of whether their spouse/significant other thinks they should stay on duty, the average response for Unit Deployers is 3.45 which is lower than others at 3.71. Based on these results our hypothesis is partially supported at a 0.1 level of significance. The logistic regression models failed to find significant results in the odds of retention based upon deployment type. These findings do not complement our logistic regression analysis. All of the results are provided in the table below.

Table 46: Summary of Survey Results: Unit Deployers

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. UD	3.98	0.77	1.18	238	0.23	Fail to reject
Other	3.87	0.89				
1b. UD	3.92	0.95	-0.22	300	0.82	Fail to reject
Other	3.95	0.97				
1c. UD	3.87	0.93	-1.48	300	0.14	Fail to reject
Other	4.02	0.86				
1d. UD	4.15	0.77	1.69	302	0.09	Reject
Other	3.99	0.88				
1e. UD	4.14	0.86	2.07	303	0.03	Reject
Other	3.9	1.05				
2. UD	3.87	0.89	-0.63	303	0.52	Fail to reject
Other	3.93	0.82				
3. UD	3.77	1.17	-2.03	303	0.04	Reject
Other	4.04	1.13				
4. UD	3.45	1.31	-1.62	265	0.11	Fail to reject
Other	3.71	1.26				
5. UD	3.34	1.12	-1.03	303	0.3	Fail to reject
Other	3.57	1.2				

Both Deployers

H_0: Mean survey responses for Both Deployers will not differ from other deployment groups.

H_A: Mean survey responses for Both Deployers will differ from other deployment groups.

Both Deployers do not differ significantly from others in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1c) opportunities for promotion, (1d) quality of coworkers, (1e) quality of supervision, (2) overall satisfaction, (3) likeliness to stay in the military, whether their (4) spouse/significant other thinks they should stay or leave on active duty, and (5) whether their family thinks they should remain. Based on the results of this analysis we fail to reject the null hypothesis. All of the results are provided in the table below.

Table 47: Summary of Survey Results: Both Deployers

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. BD	3.83	0.9	-1.17	303	0.24	Fail to reject
Other	3.95	0.82				
1b. BD	4.03	0.84	1.19	184.5	0.23	Fail to reject
Other	3.9	1				
1c. BD	4.05	0.83	1.09	300	0.27	Fail to reject
Other	3.92	0.92				
1d. BD	4.06	0.84	-0.01	302	0.98	Fail to reject
Other	4.06	0.84				
1e. BD	4.07	1.04	0.73	303	0.46	Fail to reject
Other	3.98	0.96				
2. BD	4.07	0.83	0.04	303	0.96	Fail to reject
Other	3.98	0.86				
3. BD	3.95	1.18	0.28	303	0.77	Fail to reject
Other	3.91	1.14				
4. BD	3.55	1.26	-0.43	265	0.66	Fail to reject
Other	3.63	1.3				
5. BD	3.48	1.13	-0.27	303	0.78	Fail to reject
Other	3.52	1.19				

Career Group

Do mean survey responses differ between personnel in the Operations, Logistics, and Support career groups? Responses for the Acquisitions and Special Investigations career groups were not analyzed separately due to sample sizes below 30.

Operations

H_0: Mean survey responses for personnel in the Operations career group will not differ from other career groups.

H_A: Mean survey responses for personnel in the Operations career group will differ from other career groups.

Personnel in the Operations career group do not differ significantly from others in (1a) perceptions of total compensation, (1c) opportunities for promotion, (1e) quality of supervision, (4) whether their spouse/significant other thinks they should stay on active duty, and (5) whether their family thinks they should remain. Personnel in the Operations career group differ from others, at the p is less than 0.1 level of significance, in perceptions of (1b) the type of work done in the military job, (1d) the quality of coworkers, (2) overall satisfaction, and (3) likeliness to stay in the military. Personnel in Operations have a higher average response, 4.06 versus 3.74, in perceptions of the type of work done in their military job. They also have a higher average response, 4.15 versus 3.94, in perceptions of the quality of their coworkers versus others. Responses for personnel in the Operations career groups are lower in perceptions of overall satisfaction, 3.84 versus 3.99, compared to others. Finally, Operations personnel have a lower average response in perceptions of likeliness to stay in the military, 3.81 versus 4.13, compared to personnel in other career groups. Based on the results of this analysis our

hypothesis is partially supported at the 0.1 level of significance. The logistic regression analysis did not provide significant results regarding the odds of retention for officers in the Operations career group. All of the results are provided in the table on the following page.

Table 48: Summary of Survey Results: Operations

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Operations	3.88	0.83	-1	368	0.31	Fail to reject
Other	3.97	0.87				
1b. Operations	4.06	0.87	3.06	288.97	0.01	Reject
Other	3.74	1.06				
1c. Operations	3.9	0.92	-0.31	365	0.75	Fail to reject
Other	3.93	0.94				
1d. Operations	4.15	0.8	2.37	366	0.01	Reject
Other	3.94	0.88				
1e. Operations	4.04	1.03	1.02	368	0.3	Fail to reject
Other	3.93	0.94				
2. Operations	3.84	0.86	-1.76	368	0.07	Reject
Other	3.99	0.81				
3. Operations	3.81	1.15	-2.65	368	0.01	Reject
Other	4.13	1.08				
4. Operations	3.55	1.25	-0.49	323	0.61	Fail to reject
Other	3.63	1.32				
5. Operations	3.5	1.15	0.014	368	0.98	Fail to reject
Other	3.49	1.19				

Logistics

H_0: Mean survey responses for personnel in the Logistics career group will not differ from other career groups.

H_A: Mean survey responses for personnel in the Logistics career group will differ from other career groups.

Personnel in the Logistics career group do not differ from others in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1c) opportunities for promotion, (1d) quality of coworkers, (1e) quality of supervision, (2)

overall satisfaction, whether their (4) spouse/significant other thinks they should stay on active duty, and (5) whether their family thinks they should remain. However, their average responses are significantly different from other career groups at the 0.1 level of significance in perceptions of (3) likeliness to stay in the military versus all other career groups, 4.24 versus 3.91. The logistic regression analysis indicated that the odds of retention for personnel in the Logistics career group were higher versus personnel in other career groups. The results of the survey data compliment the findings from the logistic regression models. Based on the results of this analysis our hypothesis is partially supported at the p is less than 0.1 level of significance, all of the results are provided in the table below.

Table 49: Summary of Survey Results: Logistics

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Logistics	3.87	1.04	-0.36	368	0.71	Fail to reject
Other	3.92	0.82				
1b. Logistics	3.87	1.01	-0.38	365	0.69	Fail to reject
Other	3.93	0.96				
1c. Logistics	4.11	0.84	1.36	365	0.17	Fail to reject
Other	3.89	0.94				
1d. Logistics	4.08	0.81	0.16	366	0.86	Fail to reject
Other	4.05	0.84				
1e. Logistics	3.89	0.95	-0.63	368	0.52	Fail to reject
Other	4	1				
2. Logistics	3.95	0.69	0.34	368	0.73	Fail to reject
Other	3.9	0.86				
3. Logistics	4.24	0.99	1.66	368	0.09	Reject
Other	3.91	1.14				
4. Logistics	3.61	1.35	0.12	323	0.89	Fail to reject
Other	3.58	1.27				
5. Logistics	3.26	1.17	-1.28	368	0.19	Fail to reject
Other	3.52	1.16				

Support

H_0: Mean survey responses for personnel in the Support career group will not differ from other career groups.

H_A: Mean survey responses for personnel in the Support career group will differ from other career groups.

Personnel in the Support career group do not differ from personnel in other career groups in (1a) perceptions of total compensation, (1c) opportunities for promotion, (1e) quality of supervision, (2) overall satisfaction, (3) likeliness to stay in the military, (4) whether their spouse/significant other thinks they should stay on active duty, and (5) whether their family thinks they should remain. Personnel in the Support career group differ from personnel in other career groups at the p is less than 0.1 level of significance in perceptions of (1b) the type of work done in the military job, and (1d) the quality of coworkers. The average response for perceptions of the type of work done in their military job is lower, 3.67 versus 4.01, compared to other career groups. Support personnel also have a lower response in perceptions of the quality of coworkers with an average of 3.85 versus 4.12. Based on these results our hypothesis is partially supported.

The logistic regression analysis revealed that the odds of retention were lower for personnel in the Support career group versus all others. The survey findings compliment the regression results. All of the results are provided in the table on the following page.

Table 50: Summary of Survey Results: Support

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Support	3.95	0.81	0.48	368	0.62	Fail to reject
Other	3.9	0.86				
1b. Support	3.67	1.1	-2.6	124.4	0.01	Reject
Other	4.01	0.91				
1c. Support	3.87	1.03	-0.41	365	0.67	Fail to reject
Other	3.92	0.9				
1d. Support	3.85	0.92	-2.63	366	0.01	Reject
Other	4.12	0.81				
1e. Support	3.92	0.95	-0.76	368	0.44	Fail to reject
Other	4.01	1.01				
2. Support	3.99	0.82	1.09	368	0.27	Fail to reject
Other	3.88	0.85				
3. Support	4.03	1.15	0.83	368	0.4	Fail to reject
Other	3.92	1.13				
4. Support	3.48	1.38	-0.81	323	0.41	Fail to reject
Other	3.62	1.24				
5. Support	3.51	1.25	0.15	368	0.87	Fail to reject
Other	3.49	1.14				

Gender

Do mean survey responses differ between males and females?

H_0: Mean survey responses for men will not differ from women.

H_A: Mean survey responses for men will differ from women.

Males do not differ from females in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1c) opportunities for promotion, (1d) the quality of coworkers, (1e) quality of supervision, (2) overall satisfaction, (4) whether their spouse/significant other thinks they should stay or leave on active duty, and (5) whether their family thinks they should remain. Males do differ from females in perceptions of (3) likeliness to stay in the military. The average response for men, 4.02, is higher versus women, 3.71, at the p is less than 0.1 level of significance. This finding is supported by Moore (2002) who found that men were more likely to indicate a

willingness to remain versus females. Males also demonstrated higher odds of retention versus females in the regression analysis. The results of the survey analysis complement the findings from the logistic regression analysis. Based on these results our hypothesis is partially supported. All of the results are provided in the table below.

Table 51: Summary of Survey Results: Gender

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Male	3.88	0.88	-1.53	324	0.12	Fail to reject
Other	4.05	0.72				
1b. Male	3.96	0.93	1.05	119.5	0.29	Fail to reject
Other	3.82	1.05				
1c. Male	3.95	0.91	0.32	321	0.74	Fail to reject
Other	3.91	0.93				
1d. Male	4.07	0.81	0.4	323	0.68	Fail to reject
Other	4.03	0.94				
1e. Male	4.03	0.98	0.51	324	0.6	Fail to reject
Other	3.96	0.99				
2. Male	3.91	0.85	0.01	324	0.98	Fail to reject
Other	3.91	0.87				
3. Male	4.02	1.06	1.9	113.35	0.05	Reject
Other	3.71	1.33				
4. Male	3.62	1.25	0.71	282	0.47	Fail to reject
Other	3.48	1.37				
5. Male	3.51	1.31	0.32	324	0.74	Fail to reject
Other	3.46	1.29				

Marital Status

Do mean survey responses differ for personnel who are married versus people who are not married or separated/divorced? Survey questions regarding (4) perceptions of whether their spouse/significant other thinks they should stay on active duty, and (5) perceptions of whether their family thinks they should remain were not compared between marital groups. This is due to the lack of responses from single personnel

regarding those questions. Personnel that are currently separated or divorced were not analyzed due to a sample size of 13.

Married

H_0: Mean survey responses for personnel who are married will not differ from personnel who are not married or separated/divorced.

H_A: Mean survey responses for personnel who are married will differ from personnel who are not married or separated/divorced.

Personnel who are married do not differ from personnel who are not married or separated/divorced in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1c) opportunities for promotion, (1d) the quality of coworkers, (1e) quality of supervision, (2) overall satisfaction. Personnel who are married indicate a higher average response for (3) likeliness to stay in the military. The average response for married personnel was 4.03 versus 3.8 and is significant at the p is less than 0.1 level of significance. Based on these results our hypothesis is partially supported. The survey analysis complements the results from the logistic regression analysis which showed that married personnel demonstrated higher odds of retention versus all others. All of the results are provided in the table on the following page.

Table 52: Summary of Survey Results: Married

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Married	3.92	0.84	-0.03	365	0.97	Fail to reject
Other	3.92	0.86				
1b. Married	3.94	0.97	0.66	367	0.5	Fail to reject
Other	3.87	0.97				
1c. Married	3.94	0.91	1.03	364	0.3	Fail to reject
Other	3.83	0.99				
1d. Married	4.08	0.84	0.62	365	0.53	Fail to reject
Other	4.02	0.84				
1e. Married	4.02	0.96	0.82	367	0.4	Fail to reject
Other	3.93	1.07				
2. Married	3.94	0.82	1.08	367	0.4	Fail to reject
Other	3.84	0.89				
3. Married	4.03	1.11	1.78	367	0.07	Reject
Other	3.8	1.13				

Not Married

H_0: Mean survey responses for personnel who are not married will not differ from personnel who are married or separated/divorced.

H_A: Mean survey responses for personnel who are not married will differ from personnel who are married or separated/divorced.

Personnel who are not married do not differ from personnel who are married or separated/divorced in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1c) opportunities for promotion, (1d) the quality of coworkers, (1e) quality of supervision, (2) overall satisfaction. Personnel who are not married indicate a lower average response for (3) likeliness to stay in the military. The average response for personnel who are not married was 3.77 versus 4.03 for married personnel, and has a statistical significance of p is less than 0.1. Based on these results our hypothesis is

partially supported. The logistic regression models did not provide significant results for personnel who were not married. All of the results are provided in the table below.

Table 53: Summary of Survey Results: Not Married

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Not married	3.95	0.86	0.43	365	0.66	Fail to reject
Other	3.91	0.84				
1b. Not married	3.84	1.01	-1.04	367	0.29	Fail to reject
Other	3.95	0.95				
1c. Not married	3.85	1	-0.7	364	0.48	Fail to reject
Other	3.93	0.91				
1d. Not married	4.07	0.8	0.14	365	0.88	Fail to reject
Other	4.05	0.85				
1e. Not married	3.94	1.08	-0.63	367	0.52	Fail to reject
Other	4.02	0.96				
2. Not married	3.84	0.91	-1.01	367	0.31	Fail to reject
Other	3.94	0.81				
3. Not married	3.77	1.15	-2.01	367	0.04	Reject
Other	4.03	1.1				

Commissioning Source

Do mean survey responses differ between Air Force Academy graduates, ROTC graduates, and OTS, ANGA, Other graduates?

Air Force Academy

H_0: Mean survey responses for personnel who commission through the Air Force Academy will not differ from personnel who commissioned through other sources.

H_A: Mean survey responses for personnel who commission through the Air Force Academy will differ from personnel who commissioned through other sources.

Personnel who commissioned through the Air Force Academy do not differ from personnel who commissioned through other sources in (1a) perceptions of total

compensation, (1b) the type of work done in the military job, (1e) quality of supervision and, (3) likeliness to stay in the military. Personnel who commissioned through the Academy differ in perceptions of (1c) opportunities for promotion, (1d) the quality of coworkers, (2) overall satisfaction, whether their (4) spouse/significant other thinks they should stay or leave on active duty, and (5) whether their family thinks they should remain. The average response for Academy graduates in perceptions of opportunities for promotion were lower, 3.69 versus 4.02, versus other commissioning sources and is significant at the p is less than 0.1 level of significance. The average response for Academy graduates in perceptions of quality of their coworkers was 4.18 versus others with an average response of 4; this result has a statistical significance of p is less than 0.1. Finally, the average response for Academy graduates in perceptions of overall satisfaction was lower, 3.75 versus 3.98, compared to personnel who commissioned through other sources. This finding was significant at the p is less than 0.1 level of significance. Based on these results our hypothesis is partially supported. The logistic regression analysis did not indicated any significant results for personnel who commissioned through the Air Force Academy. All of the results are provided in the table on the following page.

Table 54: Summary of Survey Results: Air Force Academy

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Academy	3.82	0.85	-1.44	368	0.14	Fail to reject
Other	3.96	0.84				
1b. Academy	3.9	1.02	-0.39	365	0.69	Fail to reject
Other	3.94	0.94				
1c. Academy	3.69	0.99	-3.07	208.51	0.01	Reject
Other	4.02	0.88				
1d. Academy	4.18	0.81	1.89	366	0.05	Reject
Other	4	0.85				
1e. Academy	4.04	1.02	0.66	368	0.5	Fail to reject
Other	3.97	0.98				
2. Academy	3.75	0.92	-2.31	204.76	0.02	Reject
Other	3.98	0.8				
3. Academy	3.88	1.11	-0.74	368	0.46	Fail to reject
Other	3.98	1.14				
4. Academy	3.45	1.26	-1.29	323	0.19	Fail to reject
Other	3.65	1.28				
5. Academy	3.55	1.04	0.71	267.39	0.47	Fail to reject
Other	3.47	1.22				

ROTC

H_0: Mean survey responses for personnel who commission through ROTC will not differ from personnel who commissioned through other sources.

H_A: Mean survey responses for personnel who commission through ROTC will differ from personnel who commissioned through other sources.

Personnel who commissioned through the ROTC do not differ from personnel who commissioned through other sources in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1d) the quality of coworkers, (1e) quality of supervision, (2) overall satisfaction and, (3) likeliness to stay in the military, whether their (4) spouse/significant other thinks they should stay or leave on active duty, and (5) whether their family thinks they should remain. . Personnel who commissioned through ROTC differ in perceptions of (1c) opportunities for promotion. The average response for

ROTC graduates in perceptions of opportunities for promotions was higher, 4.03 versus 3.81, compared to personnel who commissioned through other sources. This result has a statistical significance of p is less than 0.1. Based on these results our hypothesis is partially supported. This finding contradicts the results of the logistic regression analysis in which personnel who commissioned through ROTC demonstrated lower odds of retention. The results of the survey analysis indicate that personnel who commission through ROTC perceive higher opportunities for promotion which could be an indicator of higher retention, however the logistic regression analysis indicates lower odds of retention for personnel in the ROTC commissioning group. All of the results are provided in the table below.

Table 55: Summary of Survey Results: ROTC

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. ROTC	3.93	0.9	0.24	368	0.82	Fail to reject
Other	3.91	0.8				
1b. ROTC	3.92	0.93	-0.1	365	0.92	Fail to reject
Other	3.93	1				
1c. ROTC	4.03	0.87	2.22	365	0.02	Reject
Other	3.81	0.97				
1d. ROTC	4.11	0.84	1.06	366	0.28	Fail to reject
Other	4.01	0.84				
1e. ROTC	4	0.96	0.14	368	0.88	Fail to reject
Other	3.99	1.02				
2. ROTC	3.98	0.77	1.64	365.93	0.11	Fail to reject
Other	3.84	0.89				
3. ROTC	3.95	1.12	-0.01	368	0.99	Fail to reject
Other	3.95	1.14				
4. ROTC	3.62	1.29	0.46	323	0.64	Fail to reject
Other	3.56	1.27				
5. ROTC	3.47	1.19	-0.32	368	0.74	Fail to reject
Other	3.51	1.14				

OTS, ANGA, Other

H_0: Mean survey responses for personnel who commission through OTS, ANGA, and Other will not differ from personnel who commissioned through other sources.

H_A: Mean survey responses for personnel who commission through OTS, ANGA, and Other will differ from personnel who commissioned through other sources.

Personnel who commissioned through the OTS, ANGA, Other; do not differ from personnel who commissioned through other sources in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1c) opportunities for promotion, (1e) quality of supervision, (2) overall satisfaction and, (3) likeliness to stay in the military, whether their (4) spouse/significant other thinks they should stay or leave on active duty, and (5) whether their family thinks they should remain. Personnel who commissioned through the OTS, ANGA, Other; do differ in perceptions of (1d) the quality of coworkers. The average response for OTS, ANGA, Other in the perceptions of the quality of coworkers is lower, 4.03 versus 3.81, compared to personnel who commissioned through other sources. This result has a statistical significance of p is less than 0.1. Based on these results our hypothesis is partially supported. All of the results are provided in the table on the following page.

Table 56: Summary of Survey Results: OTS, ANGA, Other

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. OTS, ANGA, Other	4.02	0.86	1.49	169.91	0.13	Fail to reject
Other	3.88	0.84				
1b. OTS, ANGA, Other	3.98	1.02	0.54	365	0.58	Fail to reject
Other	3.91	0.96				
1c. OTS, ANGA, Other	3.99	0.85	0.87	365	0.38	Fail to reject
Other	3.89	0.94				
1d. OTS, ANGA, Other	3.79	0.75	-3.39	366	0.01	Reject
Other	4.14	0.85				
1e. OTS, ANGA, Other	3.91	0.89	-0.9	368	0.36	Fail to reject
Other	4.02	1				
2. OTS, ANGA, Other	3.97	0.81	0.78	368	0.43	Fail to reject
Other	3.88	0.84				
3. OTS, ANGA, Other	4.03	0.95	0.82	368	0.4	Fail to reject
Other	3.92	1.14				
4. OTS, ANGA, Other	3.69	1.09	0.86	323	0.38	Fail to reject
Other	3.55	1.28				
5. OTS, ANGA, Other	3.45	1.06	-0.34	128.14	0.72	Fail to reject
Other	3.51	1.17				

Pay Grade

Do mean survey responses differ between pay grades? Personnel with the paygrade of Captain and 1st Lieutenant were analyzed. 2nd Lieutenants were not analyzed due to a sample size of 7.

Captain

H_0: Mean survey responses for personnel with the paygrade of Captain will not differ from others.

H_A: Mean survey responses for personnel with the paygrade of Captain will differ from others.

Personnel with the paygrade of Captain do not differ from other paygrades in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1d) the quality of coworkers, (1e) quality of supervision, (2) overall satisfaction, (3) likeliness to stay in the military, whether their (4) spouse/significant other thinks they should stay on active duty, and (5) whether their family thinks they should remain. Personnel with the paygrade of Captain differ in perceptions of (1c) opportunities for promotion. The average response personnel with the paygrade of Captain in perceptions of the opportunities for promotion are lower than others, 3.87 versus 4.15. This result has a statistical significance of p is less than 0.1. Based on these results our hypothesis is partially supported. Pay grade was not a variable of significance in the logistic regression analysis. All of the results are provided in the table on the following page.

Table 57: Summary of Survey Results: Captain

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Capt	3.91	0.83	-0.61	368	0.54	Fail to reject
Other	3.98	0.92				
1b. Capt	3.95	0.95	0.99	66.3	0.32	Fail to reject
Other	3.79	1.08				
1c. Capt	3.87	0.96	-2.03	365	0.04	Reject
Other	4.15	0.73				
1d. Capt	4.09	0.85	1.58	366	0.11	Fail to reject
Other	3.89	0.79				
1e. Capt	4	1	0.52	368	0.6	Fail to reject
Other	3.93	0.92				
2. Capt	3.87	0.85	-1.61	368	0.11	Fail to reject
Other	4.07	0.79				
3. Capt	3.97	1.13	1.04	368	0.29	Fail to reject
Other	3.8	1.13				
4. Capt	3.59	1.3	0.32	323	0.74	Fail to reject
Other	3.53	1.15				
5. Capt	3.51	1.17	0.71	368	0.47	Fail to reject
Other	3.39	1.14				

1st Lieutenants

H_0: Mean survey responses for personnel with the paygrade of 1st Lieutenants will not differ from others.

H_A: Mean survey responses for personnel with the paygrade of 1st Lieutenants will differ from others.

Personnel with the paygrade of 1st Lieutenant do not differ from other paygrades in (1a) perceptions of total compensation, (1b) the type of work done in the military job, (1e) quality of supervision, (2) overall satisfaction and, (3) likeliness to stay in the military, whether their (4) spouse/significant other thinks they should stay or leave on active duty, and (5) whether their family thinks they should remain. Personnel with the paygrade of Captain do differ in perceptions of (1c) opportunities for promotion and (1d)

the quality of coworkers. The average response personnel with the paygrade of 1st Lieutenant are higher than others regarding perceptions of promotion opportunities, 4.15 versus 3.87. 1st lieutenants have a lower average response in perceptions of the quality of coworkers. The average response for perceptions of coworker quality was, 3.85, versus others 4.09. These results have a statistical significance of p is less than 0.1. Based on these results our hypothesis is partially supported. Pay grade was not a variable of significance in the logistic regression analysis. All of the results are provided in the table below.

Table 58: Summary of Survey Results: 1st Lieutenant

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. 1Lt	3.94	0.96	0.17	368	0.86	Fail to reject
Other	3.91	0.83				
1b. 1Lt	3.93	1.02	0.06	365	0.95	Fail to reject
Other	3.93	0.96				
1c. 1Lt	4.15	0.75	1.88	365	0.06	Reject
Other	3.88	0.95				
1d. 1Lt	3.85	0.83	-1.79	366	0.07	Reject
Other	4.09	0.84				
1e. 1Lt	3.98	0.92	-0.09	368	0.92	Fail to reject
Other	3.99	1				
2. 1Lt	4.04	0.83	1.21	368	0.22	Fail to reject
Other	3.88	0.84				
3. 1Lt	3.77	1.08	-1.16	368	0.24	Fail to reject
Other	3.97	1.14				
4. 1Lt	3.55	1.17	-0.2	323	0.84	Fail to reject
Other	3.59	1.29				
5. 1Lt	3.36	1.09	-0.83	368	0.4	Fail to reject
Other	3.51	1.18				

Chapter Summary

The results of the regression models provide some interesting insights. Themes that were present between the models were that retention based solely on deployment type did not provide statistically significant results. Models that were expanded to incorporate Career Groups and other explanatory variables demonstrated that personnel in the Support Career Group demonstrated lower odds of retention while personnel in the logistics career group demonstrate higher odds of retention versus all others. In regards to gender, Males demonstrated higher odds of retention versus females. For Marital Status, personnel who were married demonstrated higher odds of retention versus personnel who were separated or not married. Pay grade: Captains, 1 Lts, and 2 Lts did not provide significant results. As for Commissioning Groups, only personnel who were commissioned through ROTC demonstrated lower odds of retention versus all others. Academy Graduates and OTS/ANGA/Others did not provide statistically significant results. Residuals were tested for every model to determine whether there were errors or outliers present in the regression analysis. There were no errors or outliers detected based on analysis of residuals.

The survey analysis provided a large number of results. Results that compliment the findings from the regression analysis are that personnel in the Support career group have on average a lower perception of the type of work they do and the quality of their coworkers. This compliments the findings from the logistic regression analysis that personnel in the Support career group have lower odds of retention versus others. Personnel in the logistics career group had higher average responses regarding perceptions of likeliness to stay in the military which compliments the findings from the

logistic regression analysis. The average survey responses for married personnel were also higher than others regarding perceptions on staying the military which compliments the findings from the regression analysis. Average survey responses for men also indicated a higher average response for likeliness to remain versus females.

The survey analysis also provided results that did not compliment the findings from the logistic regression analysis. Personnel who commissioned through ROTC indicated a higher average perception of promotion opportunity which could be an indicator of higher retention, however the logistic regression analysis indicates a lower odds of retention for ROTC graduates.

It should be stated that the results of the regression analysis do not provide causation. There are many factors at play that affect retention. Survey data was analyzed to compare and contrast average survey responses with the results of the regression model. The next chapter addresses the research questions and more generalizable conclusions as well as limitations to this study and the possibility of additional future research.

V. Conclusions and Recommendations

Chapter Overview

This chapter summarizes and discusses the results from our research questions and logistic regression models. The data from Active Duty personnel and pay records were analyzed to determine how the odds of retention, for junior Air Force officer in Logistics, Support, Operations, Acquisitions, and Special investigations career groups, were effected by deployment type, pay grade, marital status, gender, and commissioning source. Survey responses were then analyzed from Status of Forces Surveys and compared to the results of the regression analysis. The results of this study are summarized and discussed below. Limitations are discussed as well as possible future research.

Restatement of the Problem

The Air Force is dedicated to supporting the Combatant Commander and joint missions and has deployed a large number IAs to support those missions. It is vital that the Air Force retain trained personnel who develop critical experience while deployed.

Limitations

This study develops an analytical tool which provides insight to decision makers on what factors effect the odds of retention. Survey results are then compared and contrasted with the findings of the regression models, however exact causation is not established. For example, marriage is identified as a variable interest that impacts the odds of retention however this study does not further analyze how marriage impacts

personnel's retention decisions. There are many factors that affect a person's decision to remain in the military, this study does not identify or explore all of these factors. Survey data does provide some insight into perceptions on retention however it also does not provide insights into exact causation. Another limitation of this study involves the data set, the model requires a three year retention window therefore the sample only includes personnel who have deployed from fiscal year 2001 to 2006. Furthermore, IAs are not identified by the data, instead Ahner, Heilmann, and Paron's (2011) Individual Deployer definition is used. Also, the survey results for this study were a subset of the sample identified for the regression sample. There were a limited number of responses on the surveys which limited comparisons. The DMDC data utilized for this research contained various errors which limited the available sample size, erroneous records were removed. Further data is required to expand the scope of this study. Further limitations are that this study is not able to compare and contrast voluntary versus involuntary deployments. Force shaping initiatives conducted by the Air Force occurred throughout 2001 to 2006 and the data set did not reveal who was removed from the service versus personnel that voluntary left the service. A stop loss also occurred for four months in 2003, this study was not able to account for how the stop loss affected personnel's retention decisions. Finally external factors such as economic conditions were not accounted for in this study. Assumptions were discussed in the methodology section to address these limitations.

Review of Literature

Retention studies were reviewed to discuss previous findings as well as identify variables of interest for analysis. Variables of interest identified in Fricker's (2002), Fricker and Buttrey's (2008), and Paissant's (2008) studies included deployments, gender, marital status, pay, career groups, and commissioning source. Organizational behavior theory was also briefly explored and literature from Price (2001), Price and Meler (1981), as well as analysis from LaRoco (1983) and Licklider (2009) were explored to determine areas of interest for the survey analysis. It was determined that turnover intentions were a variable of interest and the survey questions analyzed in this research measured satisfaction and retention intention.

Review of Methodology

Logistic regression analysis was utilized to analyze multiple regression models to determine what variables of interest significantly effected the odds of retention for Air Force junior officers. Logistic regression was used due to the fact that the dependent variable for this study, retention, was a dichotomous variable with only two possible outcomes. An initial model was developed to analyze the effects of deployments on retention followed by a second model which measured the effects of other independent variables to include marital status, gender, pay grade, career groups, and commissioning source. Based on the results of the first two models a parsimonious model was developed and analyzed. The results of the parsimonious model were used to develop further models which explored the effects of relationship variables on retention. Survey analysis was then conducted through the use to t-tests to compare average responses of personnel

based on the results of the regression analysis. These findings will be discussed in the next paragraph.

Restatement of Results

Based upon the results of the regression models, deployments did not show a statistically significant effect on the odds of retention for Air Force junior officers. It is possible that with the global war on terror that deployments have become the norm for personnel in the Air Force and that deployments alone do not effect retention. These results contradict other studies, Fricker (2002), Fricker and Buttrey (2008), Hosek and Totten (2002) and Paissant (2008) all found a positive association between deployments and retention. These findings also contradict Analnkaya and Kilic's 2009 where they determine that the odds of retention for officers who had deployed were higher than those who did not deploy. These findings are supported by Hall (2009) who found in his analysis of Army Dentists that deployments did not significantly effect the odds of retention for his sample. Survey analysis revealed that Individual Deployers had lower perceptions of the quality of their supervision and coworkers versus personnel who deployed with their Units. It is speculated that these individuals were serving under leadership from other services and that issues arose based on conflicting expectations and norms between the services. Individual Deployers indicated a higher average response for perceptions on whether their spouse believes they should stay on active duty versus personnel who had been on Unit deployments.

The second regression modeled revealed an increase in the odds of retention, 1.57 or 57% higher, for personnel in the Logistics Career group versus all others. The odds of

retention for personnel in the Support career group were 0.7 or 30% lower lower versus all others. The findings in this study are supported by Alankaya and Kilic's (2009) findings that supply officers demonstrated lower odds of retention versus other career groups. However the results of this analysis are contradicted by Fricker's (2002) study where he was unable to find a significant difference in the odds of retention between career groups. Two of the stressed career fields identified by AFPC (2011) included the career fields Civil Engineers and Public Affairs which fall under the Support Career Group. Survey results that complimented the results of the regression analysis are that personnel in the Logistics career group did indicated a higher average response versus other career groups on intent to stay in the military. Price and Meuler's (1981) study did determine that intent to stay had the largest impact on turnover and the results of the survey analysis do compliment the results of the regression analysis. Personnel in the Support career group indicated lower average response in perceptions of the type of work that they do as well as quality of coworkers which could indicate a lack of satisfaction with their jobs. However this finding could be limited by Price and Mueler's (1981) study which indicated that job satisfaction was not found to have a significant influence on turnover. Survey findings that did not compliment the regression findings include results from personnel in the Operations career group who indicated that their perceptions of overall satisfaction and intent to stay were lower than personnel in other career groups. The regression model did not demonstrate a difference in the odds of retention between personnel in the Operations career group versus other career groups.

Other variables of significance identified by the regression models included Male, Married, and ROTC. In general, males demonstrated higher odds of retention versus all

others with values ranged from 1.51 up to 1.58 which shows a 51-58% increase in the odds of retention for males versus females. This finding is supported by Fricker's (2002) analysis in which he found the Air Force had higher separation rates for female junior officers compared to male junior officers. Alankaya and Kilic (2009) also determined that female officers had lower odds of retention versus male officers. However Hall (2009) was not able to determine a difference in retention based on gender. Based on the results of the survey analysis, the average response for intention to remain on active duty was higher for males versus females. Moore's (2002) study also determined that males were more likely to indicate a willingness to remain in the military compared to females.

In general, married personnel demonstrated higher odds of retention versus others, the odds of retention ranged from 1.84 to 1.85 or an 84% to 85% increase in the odds of retention versus others. This finding is supported by several studies: Chow and Polich (1980), Hosek and Totten (2002), Fricker (2002), Hall (2009), Alankaya and Kilic (2009), Cellik and Karakaya (2011), and Cerman (2005) which indicate that married personnel are more likely to be retained versus others. Survey analysis also indicated that married personnel had a higher average response versus others regarding intent to stay in the military. Likewise personnel who were not married demonstrated a lower average response for intent to stay in the military.

Personnel who commissioned through ROTC demonstrated lower odds of retention versus other commissioning sources. Hall (2009) determined in his study that Military Academy graduates demonstrated higher odds of retention versus ROTC graduates. The finding in this study partially supports his finding, ROTC graduates demonstrate lower odds of retention versus all other commissioning sources however the

results for Air Force Academy graduates were not significant. Analysis of the survey data provides a contradicting result as well; personnel who commissioned through ROTC had higher perceptions of promotion opportunity versus other commissioning sources which could indicate higher retention. Academy graduates responses were lower than ROTC graduates in perceptions of promotion opportunities.

A parsimonious model was developed based on the results of the regression analysis. Based on the parsimonious model personnel in the Support career group demonstrated lower odds of retention (24% lower) and personnel in the Logistics career group demonstrated higher odds of retention (46% higher). Males and personnel who were classified as married demonstrated higher odds of retention versus all others. The odds of retention for males were 54% higher versus females and 68% higher for personnel who were married versus all others. Based on commissioning source, only ROTC was statistically significant, personnel who commissioned through ROTC demonstrated lower odds of retention (22% lower) versus all others.

Interaction variables were built based upon the results of the parsimonious model and the following results were determined. The model which tested married deployers did not provide significant results due to an error based on a small sample size. The interaction variable male deployers provided erroneous results due to sample size limitations. We failed to determine a difference in the odds of retention for male deployers. For female deployers only female unit and individual deployers provided statistically significant results. The odds of retention for female individual and unit deployers were lower than the odds of retention for male deployers. Non and Both deployers for females did not provide statistically significant results. Finally, relationship

variables were developed for gender and marital status. We failed to draw significant results from the married males variable due to erroneous results from a lack of sample size. However females who were married demonstrated and females who were not married demonstrated lower odds of retention versus all others.

Recommendations

Our research identifies variables of interest that effect the odds of retention for Air Force Junior Officers. Use of logistics regression has provided a tool to analyze personnel, deployment, and pay records to identify variables of interest for retention analysis. Even though some of the survey results contradicted the results of the regression analysis, several actually did complement the results of the regression analysis. Surveys capture perceptions and intent, while the regression analysis captured action. It is possible for personnel to state one thing and then do another, this analysis provides a tool that can be used to compare intentions to actions. This analysis provides a possible foundation for a two-step approach to studying retention for military populations. Survey analysis could be conducted to determine personnel's intentions and a logistic regression analysis could later be conducted to determine if personnel acted upon those intentions. Another possibility would be to use this analysis to identify variables of interest that effect the odds of retention, and then develop survey and analysis tools to better measure and explain how those variables effect retention. Finally, the analysis and models tested in this thesis could be utilized to determine retention if survey results are not available. The survey samples tested in this study were only a small subset of the overall population and several records were removed due to non-

response. If survey data is limited or not available, this analysis can provide insights into retention based on personnel, pay, and deployment records.

Recommendations for Future Research

We recommend that the analysis conducted in this study be expanded to observe how deployments effect the retention of enlisted personnel as well as senior officers. It would also be beneficial to expand the scope of the research to other military services and compare and contrast results between the different branches. Another possibility would be to redo the analysis with a data set that identifies IAs versus using the Individual Deployer concept. This research utilized status of forces survey data for analysis of responses for deployed personnel. It would be beneficial to conduct a survey that actually targets personnel that have deployed to capture how their experiences in the deployed environment have shaped their current perceptions. This could grant further insight into attitudes and behavior which could enable a cause and effect type of analysis to be conducted versus using secondary data. A survey could also be used to study the effects of self-selection and volunteerism versus personnel who are involuntarily tasked to deploy. Finally, Hosek and Martorell (2009) found in their study that having some deployment increased reenlistment, but that there was a point where deployments began to negatively effect retention. (Hosek, Martorell, 2009: 72) Future studies could observe how the frequency of deployments effect retention rates.

Chapter Summary

This research provides an analysis tool for decision makers to determine variables of interest that effect retention. Logistic regression analysis was utilized to observe personnel that leave the service and determine which variables significantly contribute to the odds of their retention. Survey analysis was compared and contrasted with the results of the regression models to determine if perceptions did in fact lead to action. This study builds upon previous research to develop a tool that can be used to determine what effects retention as well as a means to analyze personnel data to determine whether or not personnel act upon their perceptions which are measured through the use of survey analysis.

Appendix A. Human Subject Exemption Approval

Request for Initial Research Review and IRB Waiver Qualification

In accordance with AFIT EN 40-1, please review the research description below. As the PI I do not believe the research described meets the definition of Human Subject Research as defined by AFIT EN40-1, paragraph 2.2.

Description of Research:

The purpose of this study is to further develop and test the effects of deployments on junior officer retention in the United States Air Force. It is proposed that the results of this study will provide an insight into how retention is affected by participation in individual, unit, and both types of deployment as well as personnel that have not deployed. Other variables of interest include pay, marital status, deployment type, commissioning source, and gender. This study was sponsored by OSD P&R and variables were drawn from historical pay data and deployment data provided by DMDC which does not contain SSN's or individual identification information. Results from this study will be used for thesis research in an effort to advance the current level of knowledge regarding Air Force retention initiatives as well as deployment management.

Research Method:

Based on models from previous studies and literature; a statistical model will be developed and a logistics regression will be conducted to determine the odds of retention for Air Force junior active duty officers who deployed from Sept 2001-January 2010.

Data Source:

Data was received from DMDC and consists of the following: Active Duty Personnel Files from FY2000 through FY2009, Deployment Records sourced from the Contingency Tracking System from Sept 2001 to January of 2010, Active Duty Pay Files from FY 2000 to FY 2010, and finally Status of Forces Survey response data which consists of 12 surveys administered by the DMDC from 2002-2010. DMDC removed all unique identifiers and SSN's from the data; PIN numbers that were not tied to personal information were used to identify separate records. The demographic data collected from the records will be limited to deployment type and dates, age, gender, years of service, commissioning source, current rank, and marital status.

02/23/2011-Skipper/Kinder

Date: _____

PI Signature: _____

Reviewer Comments: _____

Date: 27 Jan 2012

Reviewer Signature: Allan R. Heminger

Instructions: Please email the completed form or any questions you may have to HumanSubjects@afit.edu

IRB Coordinator: Lori Ann Kinder, x4543, Lori.Kinder.ctr@afit.edu

02/23/2011-Skipper/Kinder

Appendix B. Logistics Regression Tables of Results

Model 1: Operations

	Exp(B)	Sig	Wald
Male	1.521	0.001	11.472
Married	1.845	0.004	8.238
Not Married	1.09	0.697	0.152
Operations	1.147	0.156	2.009
Individual Deployer	0.365	0.199	1.647
Unit Deployer	0.384	0.223	1.484
Both Deployer	0.457	0.32	0.988
1 LT	1.129	0.731	0.118
Capt	0.941	0.857	0.032
Military Academy	0.923	0.533	0.388
ROTC	0.734	0.012	6.376

Model 1: Support

	Exp(B)	Sig	Wald
Male	1.513	0.001	11.177
Married	1.85	0.004	8.255
Support	0.701	0.001	10.631
Not Married	1.088	0.704	0.144
Individual Deployer	0.321	0.15	2.073
Unit Deployer	0.331	0.161	1.963
Both Deployer	0.397	0.242	1.367
1 LT	1.14	0.71	0.138
Capt	0.933	0.835	0.043
Military Academy	0.905	0.435	0.61
ROTC	0.721	0.008	7.091

Model 1: Logistics

	Exp(B)	Sig	Wald
Male	1.582	0.001	13.673
Married	1.855	0.004	8.349
Logistics	1.575	0.005	7.979
Not Married	1.098	0.674	0.178
Individual Deployer	0.389	0.231	1.432
Unit Deployer	0.424	0.276	1.187
Both Deployer	0.506	0.388	0.745
1 LT	1.244	0.537	0.382
Capt	1.076	0.829	0.047
Military Academy	0.981	0.822	0.022
ROTC	0.748	0.018	5.621

Model 1: Acquisitions

	Exp(B)	Sig	Wald
Male	1.546	0.001	12.47
Married	1.855	0.004	8.387
Acquisitions	0.983	0.926	0.009
Not Married	1.098	0.674	0.177
Individual Deployer	0.387	0.227	1.457
Unit Deployer	0.418	0.266	1.237
Both Deployer	0.499	0.377	0.781
1 LT	1.162	0.67	0.182
Capt	0.993	0.982	0
Military Academy	0.955	0.714	0.134
ROTC	0.745	0.016	5.834

Model 1: Special Investigations

	Exp(B)	Sig	Wald
Male	1.55	0	12.603
Married	1.856	0.004	8.408
Special Inv	0.526	0.116	2.471
Not Married	1.103	0.659	0.194
Individual Deployer	0.387	0.226	1.463
Unit Deployer	0.422	0.271	1.214
Both Deployer	0.503	0.381	0.766
1 LT	1.173	0.65	0.205
Capt	1.001	0.999	0
Military Academy	0.952	0.699	0.15
ROTC	0.745	0.016	5.816

Model 2: Parsimonious Model

	Exp(B)	Sig	Wald
Male	1.535	0.001	12.056
Married	1.68	0	30.944
Support	0.762	0.011	6.52
Logistics	1.463	0.019	5.535
ROTC	0.774	0.004	8.183

Model 3: Male Deployers

Male*	Exp(B)	Sig	Wald
Individual Deployer*	1.465	0.01	6.62
Unit Deployer*	1.455	0.005	7.917
Both Deployer*	1.741	0.001	13.756
Non Deployer*	6.486	0.078	3.112
Married	1.679	0.001	30.712
Logistics	1.45	0.022	5.525
Support	0.752	0.009	6.868
ROTC	0.772	0.004	8.305

Model 4: Female Deployers

Female*	Exp(B)	Sig	Wald
Individual Deployer*	0.537	0.002	9.448
Unit Deployer*	0.686	0.031	4.644
Both Deployer*	0.78	0.315	1.011
Non Deployer*	0.63	0.749	0.102
Married	1.688	0.001	31.45
Logistics	1.482	0.015	5.861
Support	0.769	0.014	6.034
ROTC	0.776	0.005	7.939

Model 5: Married Deployers

Married*	Exp(B)	Sig	Wald
Individual Deployer*	1.555	0.001	11.924
Unit Deployer*	1.592	0.001	18.183
Both Deployer*	2.002	0.001	25.027
Non Deployer*	8.158	0.046	3.977
Logistics	1.455	0.021	5.347
Support	0.757	0.01	6.604
Male	1.526	0.001	11.662
ROTC	0.775	0.005	8.05

Model 6: Males and Marital Status

Male*	Exp(B)	Sig	Wald
Married*	2.052	0.001	32.329
Not Married*	1.108	0.472	0.517
Seperated*	0.911	0.722	0.127
Logistics	1.476	0.016	5.787
Support	0.765	0.012	6.318
ROTC	0.775	0.005	8.002

Model 7: Females and Marital Status

Female*	Exp(B)	Sig	Wald
Married*	0.582	0.001	11.428
Seperated*	0.704	0.378	0.778
Not Married*	0.594	0.005	8.055
Logistics	1.469	0.017	5.727
Support	0.769	0.013	6.162
ROTC	0.756	0.002	9.905

Appendix C. Survey Analysis Tables of Results

Perceptions of Satisfaction

1. Taking all things into consideration, how satisfied are you, in general with each of the following aspects of being in the military?

    a. Your total compensation

    b. The type of work you do in the military job

    c. Your opportunities for promotion

    d. The quality of you coworkers

    e. The quality of your supervision

2. Overall, how satisfied are you with the military way of life?

Retention Intention

3. Suppose that you have to decide whether to stay on active duty. Assuming you could stay, how likely is it that you would choose to do so?

4. Does your spouse or significant other think you should stay on or leave active duty?

5. Does your family think you should stay on or leave active duty?

Individual Deployers vs all other Deployers

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. ID	3.86	0.89	-0.67	303	0.51	Fail to reject
Other	3.94	0.83				
1b. ID	3.88	1.06	-0.63	125.34	0.53	Fail to reject
Other	3.96	0.93				
1c. ID	3.96	0.91	0.06	135.34	0.95	Fail to reject
Other	3.96	0.89				
1d. ID	3.85	0.92	-2.97	303	0.01	Reject
Other	4.13	0.8				
1e. ID	3.73	0.12	-2.97	303	0.01	Reject
Other	4.1	0.06				
2. ID	3.93	0.09	0.26	303	0.79	Fail to reject
Other	3.9	0.06				
3. ID	4.1	0.12	1.59	303	0.11	Fail to reject
Other	3.86	0.08				
4. ID	3.89	1.26	2.19	265	0.03	Reject
Other	3.5	1.29				
5. ID	3.64	1.31	1.09	124.98	0.28	Fail to reject
Other	3.46	1.12				

Unit Deployers versus all other Deployers

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. UD	3.98	0.77	1.18	238	0.23	Fail to reject
Other	3.87	0.89				
1b. UD	3.92	0.95	-0.22	300	0.82	Fail to reject
Other	3.95	0.97				
1c. UD	3.87	0.93	-1.48	300	0.14	Fail to reject
Other	4.02	0.86				
1d. UD	4.15	0.77	1.69	302	0.09	Reject
Other	3.99	0.88				
1e. UD	4.14	0.86	2.07	303	0.03	Reject
Other	3.9	1.05				
2. UD	3.87	0.89	-0.63	303	0.52	Fail to reject
Other	3.93	0.82				
3. UD	3.77	1.17	-2.03	303	0.04	Reject
Other	4.04	1.13				
4. UD	3.45	1.31	-1.62	265	0.11	Fail to reject
Other	3.71	1.26				
5. UD	3.34	1.12	-1.03	303	0.3	Fail to reject
Other	3.57	1.2				

Both Deployers vs all other Deployers

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. BD	3.83	0.9	-1.17	303	0.24	Fail to reject
Other	3.95	0.82				
1b. BD	4.03	0.84	1.19	184.5	0.23	Fail to reject
Other	3.9	1				
1c. BD	4.05	0.83	1.09	300	0.27	Fail to reject
Other	3.92	0.92				
1d. BD	4.06	0.84	-0.01	302	0.98	Fail to reject
Other	4.06	0.84				
1e. BD	4.07	1.04	0.73	303	0.46	Fail to reject
Other	3.98	0.96				
2. BD	4.07	0.83	0.04	303	0.96	Fail to reject
Other	3.98	0.86				
3. BD	3.95	1.18	0.28	303	0.77	Fail to reject
Other	3.91	1.14				
4. BD	3.55	1.26	-0.43	265	0.66	Fail to reject
Other	3.63	1.3				
5. BD	3.48	1.13	-0.27	303	0.78	Fail to reject
Other	3.52	1.19				

Operations vs all other Career Groups

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Operations	3.88	0.83	-1	368	0.31	Fail to reject
Other	3.97	0.87				
1b. Operations	4.06	0.87	3.06	288.97	0.01	Reject
Other	3.74	1.06				
1c. Operations	3.9	0.92	-0.31	365	0.75	Fail to reject
Other	3.93	0.94				
1d. Operations	4.15	0.8	2.37	366	0.01	Reject
Other	3.94	0.88				
1e. Operations	4.04	1.03	1.02	368	0.3	Fail to reject
Other	3.93	0.94				
2. Operations	3.84	0.86	-1.76	368	0.07	Reject
Other	3.99	0.81				
3. Operations	3.81	1.15	-2.65	368	0.01	Reject
Other	4.13	1.08				
4. Operations	3.55	1.25	-0.49	323	0.61	Fail to reject
Other	3.63	1.32				
5. Operations	3.5	1.15	0.014	368	0.98	Fail to reject
Other	3.49	1.19				

Logistics vs all other Career Groups

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Logistics	3.87	1.04	-0.36	368	0.71	Fail to reject
Other	3.92	0.82				
1b. Logistics	3.87	1.01	-0.38	365	0.69	Fail to reject
Other	3.93	0.96				
1c. Logistics	4.11	0.84	1.36	365	0.17	Fail to reject
Other	3.89	0.94				
1d. Logistics	4.08	0.81	0.16	366	0.86	Fail to reject
Other	4.05	0.84				
1e. Logistics	3.89	0.95	-0.63	368	0.52	Fail to reject
Other	4	1				
2. Logistics	3.95	0.69	0.34	368	0.73	Fail to reject
Other	3.9	0.86				
3. Logistics	4.24	0.99	1.66	368	0.09	Reject
Other	3.91	1.14				
4. Logistics	3.61	1.35	0.12	323	0.89	Fail to reject
Other	3.58	1.27				
5. Logistics	3.26	1.17	-1.28	368	0.19	Fail to reject
Other	3.52	1.16				

Support vs all other Career Groups

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Support	3.95	0.81	0.48	368	0.62	Fail to reject
Other	3.9	0.86				
1b. Support	3.67	1.1	-2.6	124.4	0.01	Reject
Other	4.01	0.91				
1c. Support	3.87	1.03	-0.41	365	0.67	Fail to reject
Other	3.92	0.9				
1d. Support	3.85	0.92	-2.63	366	0.01	Reject
Other	4.12	0.81				
1e. Support	3.92	0.95	-0.76	368	0.44	Fail to reject
Other	4.01	1.01				
2. Support	3.99	0.82	1.09	368	0.27	Fail to reject
Other	3.88	0.85				
3. Support	4.03	1.15	0.83	368	0.4	Fail to reject
Other	3.92	1.13				
4. Support	3.48	1.38	-0.81	323	0.41	Fail to reject
Other	3.62	1.24				
5. Support	3.51	1.25	0.15	368	0.87	Fail to reject
Other	3.49	1.14				

Males vs Females

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Male	3.88	0.88	-1.53	324	0.12	Fail to reject
Other	4.05	0.72				
1b. Male	3.96	0.93	1.05	119.5	0.29	Fail to reject
Other	3.82	1.05				
1c. Male	3.95	0.91	0.32	321	0.74	Fail to reject
Other	3.91	0.93				
1d. Male	4.07	0.81	0.4	323	0.68	Fail to reject
Other	4.03	0.94				
1e. Male	4.03	0.98	0.51	324	0.6	Fail to reject
Other	3.96	0.99				
2. Male	3.91	0.85	0.01	324	0.98	Fail to reject
Other	3.91	0.87				
3. Male	4.02	1.06	1.9	113.35	0.05	Reject
Other	3.71	1.33				
4. Male	3.62	1.25	0.71	282	0.47	Fail to reject
Other	3.48	1.37				
5. Male	3.51	1.31	0.32	324	0.74	Fail to reject
Other	3.46	1.29				

Married vs all other Marital Categories

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Married	3.92	0.84	-0.03	365	0.97	Fail to reject
Other	3.92	0.86				
1b. Married	3.94	0.97	0.66	367	0.5	Fail to reject
Other	3.87	0.97				
1c. Married	3.94	0.91	1.03	364	0.3	Fail to reject
Other	3.83	0.99				
1d. Married	4.08	0.84	0.62	365	0.53	Fail to reject
Other	4.02	0.84				
1e. Married	4.02	0.96	0.82	367	0.4	Fail to reject
Other	3.93	1.07				
2. Married	3.94	0.82	1.08	367	0.4	Fail to reject
Other	3.84	0.89				
3. Married	4.03	1.11	1.78	367	0.07	Reject
Other	3.8	1.13				

Not Married vs all other Marital Categories

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Not married	3.95	0.86	0.43	365	0.66	Fail to reject
Other	3.91	0.84				
1b. Not married	3.84	1.01	-1.04	367	0.29	Fail to reject
Other	3.95	0.95				
1c. Not married	3.85	1	-0.7	364	0.48	Fail to reject
Other	3.93	0.91				
1d. Not married	4.07	0.8	0.14	365	0.88	Fail to reject
Other	4.05	0.85				
1e. Not married	3.94	1.08	-0.63	367	0.52	Fail to reject
Other	4.02	0.96				
2. Not married	3.84	0.91	-1.01	367	0.31	Fail to reject
Other	3.94	0.81				
3. Not married	3.77	1.15	-2.01	367	0.04	Reject
Other	4.03	1.1				

Air Force Academy vs all other Commissioning Sources

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Academy	3.82	0.85	-1.44	368	0.14	Fail to reject
Other	3.96	0.84				
1b. Academy	3.9	1.02	-0.39	365	0.69	Fail to reject
Other	3.94	0.94				
1c. Academy	3.69	0.99	-3.07	208.51	0.01	Reject
Other	4.02	0.88				
1d. Academy	4.18	0.81	1.89	366	0.05	Reject
Other	4	0.85				
1e. Academy	4.04	1.02	0.66	368	0.5	Fail to reject
Other	3.97	0.98				
2. Academy	3.75	0.92	-2.31	204.76	0.02	Reject
Other	3.98	0.8				
3. Academy	3.88	1.11	-0.74	368	0.46	Fail to reject
Other	3.98	1.14				
4. Academy	3.45	1.26	-1.29	323	0.19	Fail to reject
Other	3.65	1.28				
5. Academy	3.55	1.04	0.71	267.39	0.47	Fail to reject
Other	3.47	1.22				

ROTC vs all other Commissioning Sources

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. ROTC	3.93	0.9	0.24	368	0.82	Fail to reject
Other	3.91	0.8				
1b. ROTC	3.92	0.93	-0.1	365	0.92	Fail to reject
Other	3.93	1				
1c. ROTC	4.03	0.87	2.22	365	0.02	Reject
Other	3.81	0.97				
1d. ROTC	4.11	0.84	1.06	366	0.28	Fail to reject
Other	4.01	0.84				
1e. ROTC	4	0.96	0.14	368	0.88	Fail to reject
Other	3.99	1.02				
2. ROTC	3.98	0.77	1.64	365.93	0.11	Fail to reject
Other	3.84	0.89				
3. ROTC	3.95	1.12	-0.01	368	0.99	Fail to reject
Other	3.95	1.14				
4. ROTC	3.62	1.29	0.46	323	0.64	Fail to reject
Other	3.56	1.27				
5. ROTC	3.47	1.19	-0.32	368	0.74	Fail to reject
Other	3.51	1.14				

OTS, ANGA, Other versus all other Commissioning Sources

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. OTS, ANGA, Other	4.02	0.86	1.49	169.91	0.13	Fail to reject
Other	3.88	0.84				
1b. OTS, ANGA, Other	3.98	1.02	0.54	365	0.58	Fail to reject
Other	3.91	0.96				
1c. OTS, ANGA, Other	3.99	0.85	0.87	365	0.38	Fail to reject
Other	3.89	0.94				
1d. OTS, ANGA, Other	3.79	0.75	-3.39	366	0.01	Reject
Other	4.14	0.85				
1e. OTS, ANGA, Other	3.91	0.89	-0.9	368	0.36	Fail to reject
Other	4.02	1				
2. OTS, ANGA, Other	3.97	0.81	0.78	368	0.43	Fail to reject
Other	3.88	0.84				
3. OTS, ANGA, Other	4.03	0.95	0.82	368	0.4	Fail to reject
Other	3.92	1.14				
4. OTS, ANGA, Other	3.69	1.09	0.86	323	0.38	Fail to reject
Other	3.55	1.28				
5. OTS, ANGA, Other	3.45	1.06	-0.34	128.14	0.72	Fail to reject
Other	3.51	1.17				

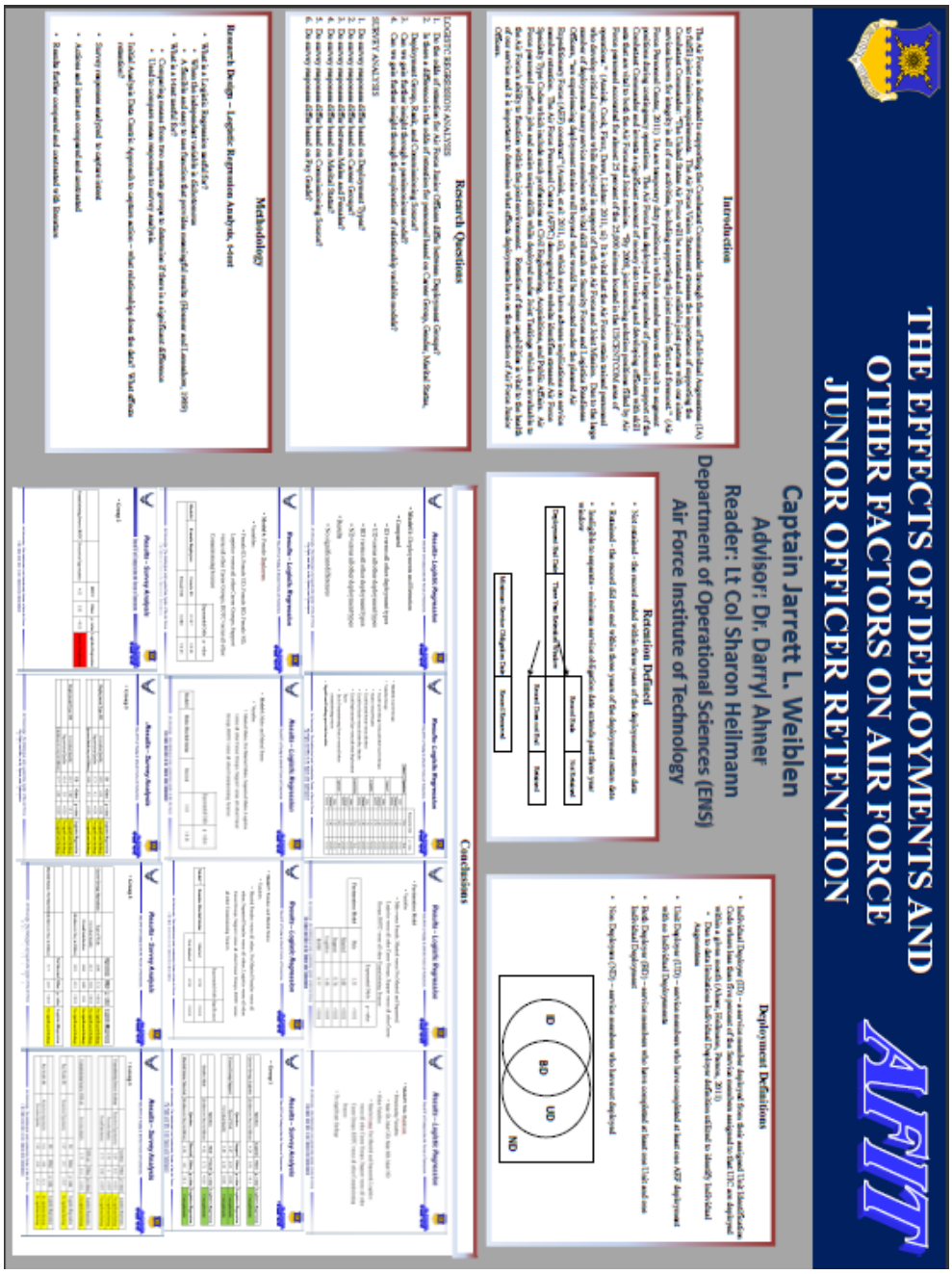
Captain versus all other Pay Grades

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. Capt	3.91	0.83	-0.61	368	0.54	Fail to reject
Other	3.98	0.92				
1b. Capt	3.95	0.95	0.99	66.3	0.32	Fail to reject
Other	3.79	1.08				
1c. Capt	3.87	0.96	-2.03	365	0.04	Reject
Other	4.15	0.73				
1d. Capt	4.09	0.85	1.58	366	0.11	Fail to reject
Other	3.89	0.79				
1e. Capt	4	1	0.52	368	0.6	Fail to reject
Other	3.93	0.92				
2. Capt	3.87	0.85	-1.61	368	0.11	Fail to reject
Other	4.07	0.79				
3. Capt	3.97	1.13	1.04	368	0.29	Fail to reject
Other	3.8	1.13				
4. Capt	3.59	1.3	0.32	323	0.74	Fail to reject
Other	3.53	1.15				
5. Capt	3.51	1.17	0.71	368	0.47	Fail to reject
Other	3.39	1.14				

1st Lieutenant versus all other Pay Grades

	Mean	Stand Dev	t-stat	Deg Freedom	Sig (2 tail)	Reject Null?
1a. 1Lt	3.94	0.96	0.17	368	0.86	Fail to reject
Other	3.91	0.83				
1b. 1Lt	3.93	1.02	0.06	365	0.95	Fail to reject
Other	3.93	0.96				
1c. 1Lt	4.15	0.75	1.88	365	0.06	Reject
Other	3.88	0.95				
1d. 1Lt	3.85	0.83	-1.79	366	0.07	Reject
Other	4.09	0.84				
1e. 1Lt	3.98	0.92	-0.09	368	0.92	Fail to reject
Other	3.99	1				
2. 1Lt	4.04	0.83	1.21	368	0.22	Fail to reject
Other	3.88	0.84				
3. 1Lt	3.77	1.08	-1.16	368	0.24	Fail to reject
Other	3.97	1.14				
4. 1Lt	3.55	1.17	-0.2	323	0.84	Fail to reject
Other	3.59	1.29				
5. 1Lt	3.36	1.09	-0.83	368	0.4	Fail to reject
Other	3.51	1.18				

Appendix D. Story Board



Bibliography

Adler, Amy B., & Castro., C. (2001). *U.S. Soldiers and Peacekeeping Deployments.* Ft. Detrick, US Army Medical Research & Materiel Command.

Air Force Personnel Center. (2011). Air Force Stressed AFSCs Report. Retrieved January 2012, http://w11.afpc.randolph.af.mil/demographics/ReportSearch.asp

Ahner, Darryl, Heilmann, S. & Parson, C. (2011) *Individual Deployer* Analysis. AFIT Center for Operational Analysis, WPAFB.

Ahner, Darryl K. and Spainhour, R. (2001) *Development of Analytical Models of Blue Force Interaction with Improvised Explosive Device Incidents.* AFIT Center for Operational Analysis, Unpublished Report.

Alankaya, Murat & Kilic, H. (2009) *An Analysis of the Effect of the Global War on Terror on the Retention of Graduates of the U.S. Naval Academy.* MS thesis, Naval Postgraduate School, Monterary.

Ausink, John A. & others. (2011) *Managing Air Force Joint Expeditionary Taskings in an Uncertain Environment.* Santa Monica: RAND Corporation.

Carboon, Isla & others. (2009) "The Relationship Between Deployment and Turnover in Australian Navy Personnel." *Military Psychology,* 21(2), 233-240.

Celik, Hasan. & Karakay, F. (2011) *An Analysis of the Effect of Commissioning Sources on the Retention and Promotion of Surface Warfare Officers (SWOs) in the U.S. Navy.* MS Thesis, Naval Postgraduate School, Monteray.

Cerman, Guray &, Kaya, B. (2005) *An Analysis of the Effect of Marital and Family Status on Retention, Promotion, and On-the-job Productivity of Male Marine Corps Officers.* MS Thesis, Naval Postgraduate School, Monteray

Chairman of the Joint Chiefs of Staff. (2004) *CJCSI 1301.01C Individual Augmentation Procedures.* Washington, Joint Chiefs of Staff.

Chow, Winston K. & Polich, M. (1980) *Models of the First-Term Reenlistmen Decision.* Santa Monica: RAND Corporation.

Colquitt, Jason A., Lepine, A. & Wesson, J. (2009) *Organizational Behavior: Improving Performance and Commitment in the Workplace*. New York: McGrawHill/Irwin.

Committee on Appropriations. (2010) *Hearings Before a Subcommittee of the Committee on Appropriations House of Representatives.* Washington, Department of Defense Appropriations.

Department of Defense. (2009) *Automated Extract of Active Duty Military Personnel Records*. DOD Instruction 1336.05, Washington: GPO.

Department of the Air Force. (2011) *Air Force Officer Classification Directory.* AFOCD 2011, San Antonio: Randolph AFB.

Department of the Air Force. *Air Force Operations Planning and Execution* AFI10-401 Washington: HQ USAF, 7 December 2006.

Department of the Air Force. (2010) *Classifying Military Personnel (Officer and Enlisted)* AFI36-2101 Classification. Washington: HQ USAF.

Field, Andy. (2009) *Discovering Statistics Using SPSS Third Edition* Thousand Oaks: Sage Publications.

Fricker, Ronald D. (2002) *The Effects of Perstempo on Officer Retention in the U.S. Military,* Santa Monica: RAND Corporation.

Fricker, Ronald D. & Buttrey, S. (2008) *Assessing the Effects of Individual Augmentation (IA) on Active Component Navy Enlisted and Officer Retention.* Naval Postgraduate School, Monterary.

Garson, David G. (2011) Logistic Regression. Excerpt from online article retrieved January 2012, from page. http://faculty.chass.ncsu.edu/garson/PA765/logistic.htm

Gibson. (2009) "*Talking Paper on The History of USAF Force Management*". Air Force A1PPS. Unpublished report.

Hall, James. (2009) *An Analysis of Army Dentists Using Logistic Regression: A Discrete Time Logit Model for Predicting Retention.* MS thesis, US Army Medical Department Center and School, Fort Sam Houston.

Hosek, James, Kavanagh, J., & Miller, L. (2006) *How Deployments Affect Service Members.* Santa Monica: RAND Corporation.

Hosek, James & Totten, M. (2002) *Serving Away From home: how Deployments Influence Reenlistment.* Thousand Oaks: Sage Publications.

Hosmer, David W. & Lemeshow, S. (2000) *Applied Logistic Regression Second Edition.* New York: John Wiley and Sons

Kanji, Gopal K. (2006) *100 Statistical Tests Third Edition*
Thousand Oaks: Sage Publications.

LaRocco, James M. (1983) "Job Attitudes, Intentions, and Turnover: An Analysis of Effects Using Latent Variables." *Human Relations*, 39(9): 872-840.

Leabo, Dick A. (1972) *Basic Statistics Fourth Edition*.
Homewood: Richard D. Irwin.

Licklider, Christy A. R. (2011) *A Meta-Analysis of the Antecedents of Voluntary Turnover In Studies Involving Active Duty Military Member Populations.* MS thesis, AFIT/GEM/ENS/11-01. School of Engineering and Management, Air Force Institute of Technology (AU), Wright-Patterson AFB OH.

Menard, Scott. (2002) *Applied Logistic Regression Analysis Second Edition*
Thousand Oaks: Sage Publications.

Microsoft Office 2007. (2007) Microsoft Corporation. Computer Software.
Redmond.

Neter, John & others. (1983) *Applied linear Regression Models*.
Homewood: Richard D. Irvin, Inc.

Newbould, Paul & others. *Statistics for Business and Economics Seventh Edition.*
New Jersey: Prentice Hall. 2010.

Pampel, Fred C. (2000) *Logistic Regression: A Primer*
Thousand Oaks: Sage Publications.

Peduzzi, Peter & others. (1996) "A Simulation Study of the Number of Events per Variable in Logistic Regression Analysis." *J Clin Epidemiol*, 49 (12), 1373 - 1379

Price, James L. (1981) "A Causal Model of Turnover for Nurses"
Academy of management Journal, 24(3), 543-565

Price, James L. (2001) "Reflections on the Determinants of Voluntary Turnover"
International Journal of Manpower, 22(7), 600-675

PASW Statistics. (2009) SPSS Version 18, IBM. Computer Software. Polar Engineering and Consulting, New York.

Vita

Capt Jarrett Weiblen was born and raised in Castroville, Texas. He commissioned through ROTC after receiving his baccalaureate of science in sociology from Texas A&M University in College Station, TX. Upon commissioning he was assigned to the 82 LRS at Sheppard AFB, TX as a Logistics Readiness Officer where he managed the readiness program and served as the Traffic Management Flight Commander. Capt Weiblen was next assigned to the 355 LRS at Davis-Montha AFB where he served in a variety of roles including Vehicle Operations Superintendent, Supply Flight Commander, Fuels Flight Commander, and Interim Director of Operations. During his time at Davis-Monthan Capt Weiblen was deployed twice and was awarded the Bronze Star Medal for his service in Afghanistan as an Embedded Trainer with the Afghanistan National Army. Following graduation he will be assigned to the joint staff at EUCOM.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From – To)*
22-03-2012	Master's Thesis	4 Aug 2010 – 23 March 2012

4. TITLE AND SUBTITLE
The Effects of Deployments and Other Factors on Air Force Junior Officer Retention

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Weiblen, Jarrett L. Captain, USAF

5d. PROJECT NUMBER
N/A

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S)
Air Force Institute of Technology
Graduate School of Engineering and Management (AFIT/ENV)
2950 Hobson Way, Building 640
WPAFB OH 45433-8865

8. PERFORMING ORGANIZATION REPORT NUMBER
AFIT/LSCM/ENS/12-22

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Intentionally Left Blank

10. SPONSOR/MONITOR'S ACRONYM(S)
4T

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Distribution Statement A: Approved for Public Release, Distribution is Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The Air Force is dedicated to supporting the Combatant Commander through the use of IAs to fulfill joint mission requirements. The Individual Deployer (ID) definition is used to identify IAs through Personnel, Pay and Deployment data provided by the Defense Manpower Data Center (DMDC). Logistics Regression analysis is conducted to determine the effects of deployments and other variables of interest on the odds of retention for Air Force Junior Officers. Survey responses drawn from Status of Forces surveys spanning fiscal years 2003-2009; are analyzed and compared and contrasted with the logistic regression results. This research develops analytical models for decision makers that identify factors that effect retention. The odds of retention increase for Males, personnel that are married, and personnel in the Logistics Career Group. The odds of retention decrease for Females, personnel in the Support Career Group, and for personnel who commission through ROTC.

15. SUBJECT TERMS
Retention, Deployment, Logistic Regression, Individual Augmentee, Individual Deployer, Survey Analysis

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Ahner, Darrly K., LTC, Ph D., USA
4T	4T	4T	4T	168	19b. TELEPHONE NUMBER *(Include area code)* (937) 255-3636, x 4708 (Darryl.Ahner@afit.edu)